THE

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DEPARTMENT OF AGRICULTURE, CEYLON.

Peradeniya, October 15, 1913.

The proposals for the organization of the Department of Agriculture, Ceylon, were published as Sessional Papers No. XIII and No. XXXI of 1913 with copy of a despatch from the Secretary of State approving them. We reproduce in this issue the scheme of organization in tabular form from which it will be seen that the technical and administrative branch of the Department has been organized under seven Divisions. Four of these are under Divisional Heads; two (Experiments, and Chemistry and Rubber Research) are for the present being administered by the Director; and one, Agricultural Education, has as yet received no establishment.

From a perusal of the column under "Sections" it will appear that the range of Agriculture is comprehensive though certain activities of the Department are not therein covered, one being the promotion of the Co-operative Credit Movement taken over by the Department in March last and now forming an important branch of its work.

No reference is made in the table to the Committee of Agricultural Experiments or Committee of Agriculture as it might perhaps be more appropriately styled as it deals with many agricultural topics besides those relating specially to

experimental work. It consists at the present time of 30 members representative of the Department, of the Provincial Administration and of the Planting industries of the Island. It is the most representative agricultural body in the Island, it being the only one at whose meetings officials and non-officials, and those interested in plantation and low-country products collect for discussion.

It may be pointed out also that under "Magazines" the editing and managing of this JOURNAL is included, both the Editor and the Assistant Editor being officers of the Department. Though our readers may not realize the labour involved in producing a journal of this size monthly with no special staff set apart for it they appreciate, we may believe, this detail of the Department's work.

R. N. L.

THE "BURMA ECONOMIST."

This is the title of a monthly magazine devoted to Agriculture, Industries, Commerce and kindred subjects. The first issue of the publication (July 1913) contains, amongst the interesting articles, letters of welcome from several persons.

An article entitled "About Ourselves" explains the need for such a publication and the lines upon which it is to be run. It is the intention of those responsible for the *Burma Economist* to do their utmost to educate and inform their readers with Love and Charity as their motives, Truth and Justice as their guides and the Well-being of all as their end.

The special articles in this number include:— Advance India, by the HON. MR. M. DE P. WEBB; Looking Forward; Wake Up! Young Burma! and The Planting Industries of Ceylon by MR. C. DRIEBERG. In the section devoted to machinery will be found accounts (1) of an invention by a Ceylon Student and (2) Some New Patents by Ceylon Planters, MESSRS. JOHN GLEN WARDROP and CHARLES COWIE STEPHEN who have had their specifications accepted for "Improvements in and relating to machines for clearing scrap rubber and other substances."

The other articles are on:— Seed Stores; Paddy and Green Manure; Dry-farming; Fibre Plants; Produce, etc.

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THE STANDARDIZATION OF PLANTATION RUBBER.

The depression in the plantation rubber market has given rise to a serious situation notwithstanding the fact that there would seem to be grounds for believing that the great disparity between plantation and Para is to some extent at least artificial.

The wild Landolphia rubber of East Africa is collected as scrap by natives who work in the forests without any supervision. It is rolled into balls or 'sausage' and in the process of rolling collects bark, sand and other impurities which, however, are not washed out. The writer on one occasion picked at random out of a merchant's go-down a sample of sausage such as is now being quoted at a premium of a penny or twopence over best plantation sheet and by merely soaking it in a tub reduced its weight by 14 per cent. through loss of sand and bark. It is impossible to believe that our clean biscuit and sheet can for long occupy a place of inferiority to this impure forest product.

This Landolphia rubber industry of the East coast is in the hands of Indian traders who purchase the rubber from native collectors whom they have previously financed. Some of their profit is derived from goods provided to the collector who does not take out all his emoluments in cash but keeps up a running account.

The price at which traders purchase varies according to the wages prevailing in the particular locality. It may be a rupee a pound, or one rupee and a quarter or a half. The practice in one place which the writer can recall was to place copper coin in the scale against rubber; a rupee's worth of copper coin weighing a pound. The rubber is seldom or, one may say never, dry, when brought in so that the trader must always allow for loss; sometimes indeed it is soaking wet. It is safe to assert that the best grades of East African Landolphia—Mozambique sausage and Lamu ball—cannot be placed f. o. b. under 2/- a lb. Ceara scrap, the produce of the German East African plantation, costs about the same amount.

This class of rubber has suffered a decline of only 6*d.* from the corresponding period of last year and Landolphia a decline of a little over 1/-; plantation sheet having in the same period dropped about 2/-. Neither Landolphia,

as we have indicated, nor yet Ceara can compare in cleanliness with plantation but they are both now priced higher. In one respect they surpass plantation—the quality does not vary. Mozambique sausage, whether from Inhambane or Beira, is always constant in quality and the same may be said of Lamu ball whether from British or German East Africa.

Rubber can be produced in Ceylon cheaper than in any other country in the world so that we may take it that unpleasant as the present condition of things is, the industry in this country is not at the present moment threatened with disaster. But at the same time the situation is one that demands serious thought and if it leads on to improved methods it will not have come in vain. One thing seems necessary and that is to give plantation that one quality which it now, alone of all rubbers in the world, lacks, namely uniformity. The precise steps required to accomplish are now being studied by the Department of Agriculture, but the scheme of research will need to be well supported if it is to bear fruit, and this brings us to the consideration of a second step that would seem no less called for, that is to say co-operation. At the Ninth Congress of the International Co-operative Alliance held in Glasgow on August 25th there were 600 delegates representing over 20,000,000 members of 130,000 societies. Lord Grey delivered the Presidential Address and in the course of it said:—

"What is the nature of the benefit which the application of the Co-operative principle to our industrial system claims to offer to the people? The application of the co-operative principle to our industrial life has proved in England, the United States, France, Germany, Denmark, and Ireland, that, by the substitution of organized distribution for unorganized distribution, by the substitution of co-operative buying for individual buying, of co-operative transportation and marketing for individual selling, and of co-operative use of power for the individual use of expensive machinery, the wants of both producer and consumer can be met more effectively, and at less cost. In this way it secures to the consumer a reduction in the cost of living and a greater command of, not only the necessaries, but the comforts and conveniences of life—a most material consideration in this age of rising prices. And to the producer it secures a substantial increase in the amount of net profits available for distribution, or, in other words, an increase of

that fund from which alone can be drawn those higher wages which we all desire to secure for the underpaid workers of the civilized world.

Co-operation means the elimination of every unnecessary middleman. The principle of co-operation requires that the services of every necessary middleman shall be adequately and honourably remunerated, but it also requires that every unnecessary toll taken from an article on its way from the producer to the consumer shall be removed."

These words are worth pondering over. We may take it that all agree that plantation rubber would obtain better consideration if it were standardized, that is, if it were of even grade like Danish butter. Standardization can be effected in two ways. One by all plantations adopting a set system of preparation proved to give the best results after vulcanization ; the other by planters ceasing to manufacture rubber and confining their operations solely to the coagulation of latex ; the subsequent preparation to be carried out in a few large central factories.

It is by the central factory system that the dairy industries of the Dominions have been built up and that Australia and New Zealand can now place butter and cheese of uniform quality on the London market. It could never have done this if each dairy farmer had insisted upon manufacturing his own produce. The frozen mutton industries of New Zealand and the Argentine have been developed on similar principles.

We don't suggest that co-operation need stop at preparation but we certainly believe the industry would be lifted to an altogether different plane if co-operation were adopted even to this extent.

We hope to return to this subject and to indicate some general lines upon which the central factory system might be worked.

R. N. L.

JETHRO TULL.

JETHRO TULL, the subject of our frontispiece, was born at Basildon Berkshire, in 1674. He entered St. John's College, Oxford, in 1691, and was called to the Bar at Gray's Inn in 1699 but never practised. In that year he married and began farming on his father's land at Howberry, near Wallingford, and here about 1701 he invented and perfected his machine drill and began experiments in his new system of sowing in drills or rows sufficiently wide apart to allow for tillage by plough and hoe during almost the whole period of growth. In 1709 he moved to a farm near Hungerford and from 1711 to 1714 travelled in France and Italy, making careful observations of the methods of agriculture in those countries which aided and confirmed his theories as to the true use of manure and the importance of "pulverizing" the soil. He published an account of his agricultural experiments or theories in 1731, when his *Horse-hoeing Husbandry* appeared. This was followed in 1733 by *The Horse-hoeing Husbandry, or an Essay on the Principles of Tillage and Vegetation.* He was attacked in the agricultural periodical *The Practical Husbandman and Farmer*, and accused of plagiarizing from such earlier writers as SIR A. FITZHERBERT, SIR HUGH PLAT (1552-1611 ?), GABRIEL PLATTES (fl. 1638) and JOHN WORLIDGE (fl. 1669-1698). TULL answered in various smaller works forming additions to his main work. He died on the 21st of February 1741. Many editions of his *Horse-hoeing Husbandry* were published subsequently, and in 1822 WILLIAM CORBETT edited it. It was translated into French.

THE FIJI PLANTERS' JOURNAL.

The Planters' Association of Fiji published the first number of its new Journal in July 1913. The Journal is being edited by H. H. THIELE who is also the Secretary of the Association. The Association is of opinion that as a profitable financial proposition they can say nothing in favour of this adventure, their chief aim being to carry on the task satisfactorily in every way but without a loss; and it is their intention to make the Journal as up-to-date and of as high a standard as possible. The present number deals with the cultivation of Coconuts, Bananas; Coconut Pests and other agricultural subjects, statistics, and a note on cattle breeding.

In the introduction it states:—" It is our intention to advocate co-operation and a feeling of self-reliance amongst the planters. They must themselves work up, propose, and do their best to carry through measures to their own advantage and, it follows, to the advantage of the whole community. In doing this we may safely rely on the approval of H. M. Government."

We welcome this newest addition to the ranks of Tropical Agricultural literature and wish it every success.

FERMENTATION OF CACAO*
AND OTHER CROPS.

This book has been published for several reasons, all culminating in the one, viz., to encourage and facilitate the crops produced by even the smaller and smallest owners being carefully and scientifically prepared "to type," so as to cause the largest buyers to take an interest in them, and be able to buy them "forward," through the shipping and exporting firms, brokers, &c., in full confidence that the produce when delivered at their factories will be up to the required standard, and free from mould, worminess, insufficient curing and other blemishes. At present the large numbers of small parcels of produce that come forward, varying in colour and quality, cause the planters to lose money, and the manufacturers to expend both time and money in trying to remedy defects that could be prevented at the outset.

Every endeavour has been made to bring together the most reliable information so far published on the intricate methods by which the above object can be achieved, and the encouraging remarks of Sir George Watt have caused the Publishers to believe that the efforts of the Editor and themselves to make the work as complete as possible, have not altogether been without success. "I have read every word of your book on 'The Fermentation of Cacao,'" writes Sir George Watt in the foreword, "with absorbing interest, and must congratulate you on being able to bring out a book that will become a classic on the subject it deals with so ably. You have brought together the opinions of several experts of scientific eminence and practical experience, and these must be drawn upon by all subsequent investigators."

The possibility of making alcohol or vinegar from the refuse liquor is also discussed, whilst the Editor, in the Preface, quotes leading press reports showing the demand on all sides for alcohol as a liquid fuel, a fact which, as he points out on the footnote on p. xxvii., coconut, sisal and manila hemp planters should also carefully note.

Again, those who, whilst earning their living as planters, estate managers government experts, &c., have worked, and are working, so strenuously in the Tropics to keep the Mother Country supplied with foodstuffs and raw material at a low price to suit the pockets of the million, will, it is believed, appreciate the way in which the Editor, on pp. xliii. and xliv. of the Preface, calls for more recognition on the part both of the authorities and the general public on this side to the importance of the tropical planter to their factories and homes, and will be glad to see his suggestion that these men of peace should be trained at Agricultural Colleges in the Tropics, *founded with public money*, to understand the handling and use of the machines and munitions of the art of peace as we have for years been teaching others at the expense of the public to understand and to handle the machines and munitions of the art of war. Without the man of peace, the man of war would die of starvation; surely therefore it will be wise of the Public and our Government to pay more attention to the training of these men of peace, in order that the prosperity and prestige of the Empire may be maintained.

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* Edited by Harold Hamel Smith (Editor *Tropical Life.*)

INTERNATIONAL INSTITUTE OF AGRICULTURE

The August number of the "Bulletin of Agricultural Statistics" edited under the direction of Prof. Umberto Ricci has just been published by the International Institute of Agriculture.

This number contains tables showing the area cultivated, the condition of the crops and the production of cereals.

For *wheat*, the production in Russia in Europe (63 *Governments*) is estimated at 183,624,957 quintals, or 108·2 % of last year's production, and in Russia in Asia (10 *Governments*) it is estimated at 37,511,253 quintals, or 133·5% of the 1912 production. In the United States the production, estimated last month at 190,784,160 quintals, is now raised to 202,356,131 quintals, or 101·8 % of last year's.

In the following countries the total of the production is forecasted as likely to reach 730,557,563 quintals, or 103·9 % of last year's production (793,118,379 quintals): Prussia, Belgium, Bulgaria, Denmark, Spain, England, Hungary, Italy, Luxemburg, Russia in Europe and in Asia, Switzerland, Canada (winter wheat only), United-States, India, Japan, Algeria (excluding the department of Algiers), and Tunis.

Taking the totals of all countries from which reports have come, for *rye* (Prussia, Belgium, Bulgaria, Denmark, Spain, Hungary, Italy, Luxemburg, Russia in Europe and in Asia, Switzerland and United States), for *barley* same countries, plus England, Japan, Algeria and Tunis), and for *oats* (same countries, as for barley), the total production is estimated respectively at 357,857,938 quintals, 249,078,475 quintals and 420,756,614 quintals, or 91·2 ; 100·1 ; and 89·7 % of the corresponding productions in 1912.

The yield of *maize* is forecasted as follows : 6,300,000 quintals, against 6,368,002 in 1912, in Spain ; 14,906,219 against 20,221,186 in Russia in Europe ; and 678,714,720 against 793,716,731 in the United States.

For *rice* the following forecasts are given ; Spain 2,500,000 quintals, against 2,442,260 in 1912 ; and United States 5,511,240 quintals against 5,114,022.

Important information is also given in the current number of the Bulletin about the flax, sugar-beet, vine, tobacco and cotton crops.

The production of *linseed* in Belgium, Spain, United States, India and Japan is estimated at 10,675,172 quintals, or scarcely 77·2 % of last year's production (13,819,517 quintals).

The sugar-beet and tobacco crops are in good condition generally.

For these products the forecasts are known only for Spain (10,800,000 quintals, or 100 % of the production in 1912) of sugar-beet, for the United States (4,064,166 quintals, against 4,367,414 in 1912) of tobacco, and for Japan (450,000 quintals, against 425,000 in 1912) of tobacco.

The production of *wine* is forecasted as likely to reach 16,465,000 hectolitres or 100 % of the 1912, production, in Spain ; 462,000 hectolitres, against 903,000 in 1912, in Switzerland ; 3,600,000 hectolitres against 2,493,681 last year in Algeria (excluding the department of Algiers.

The weather has been as a rule unfavourable to the vines, but in Italy an abundant vintage is expected.

As regards *silk production*, the data of the preceding bulletin are reproduced, with the addition of the production of summer cocoons in Japan (19,634,000 kilogrammes against 20,013,971 in 1912), and of the quantity of eggs set for incubation for autumn rearing in the same country (333,000 hectogrammes, against, 341,994 in 1912).

The Bulletin ends with the usual tables containing the data of the imports and exports of the chief cereals and of cotton, visible stocks of cereals, and finally the prices quoted for these products on the principal markets.

CASTOR OIL.

Samples of 5 different varieties of African castor seed forwarded to the Imperial Institute varied in oil content from 41·9 % to 49·5 % *z*.

The price of Standard Bombay castor seed is about £12 per ton.

In selecting a variety for cultivation choose one which yields a high percentage of oil, returns a good yield of seed per acre, and ripens the bulk of its crop at one time.

FIBRE OF VIGNA SINENSIS.

The Imperial Institute Journal Vol. X, No. 3, mentions a fact which, we believe, is not locally known, namely, that the fibre of this plant which produces the "long-bean" (*Sinh.* Me-karal) is used in Northern Nigeria for making fishing nets, owing to its being little affected by water.

The examination of the fibre at the Imperial Institute showed that it was strong enough to serve as a substitute for hemp and should be saleable in Europe if grown in quantity and properly prepared. The drawback is the shortness of the fibre which is got from the stalks which bear the flowers and fruit.

It is hardly likely, however, that anything like the quantity of the fibre required for a European trade will ever be forthcoming, as the plant is not cultivated on an extensive scale though the fruit is a favourite curry-bean.

C. D.

RUBBER.

CEARA RUBBER.

At the Fourth Day of the Annual Meeting of the United Planters' Association of South India, MR. MAHON gave the following useful and valuable information in the course of an interesting discussion:—

I have several times been asked the question of "How is Ceara likely to pay in Coorg?" so without making any lengthy speech on the matter, I should just like to say a few words with a view of getting more thoroughly into touch with those, who like myself, take an interest in this species of the Rubber Industry, and thus endeavour to encourage a higher standard of working for our mutual benefit.

Many of you will have read MR. ANSTEAD's letter on this product in the *Chronicle*, written after a visit he paid to the estates in Coorg that I have to do with. Here this gentleman ably describes our different methods of cultivation and tapping, together with his criticisms thereon, which hardly leave me room for further comment. I should however endorse his remarks as to the importance of giving the trees a thorough cultivation from the start. Many men have been content to plant large fields of Ceara, and then leave them more or less to struggle on, as best they can, amidst a jungle of grass and weed. I should say at once cultivate it properly or leave it alone. Much valuable land, money, and time have been wasted in the past in this respect. That Ceara will pay and pay well, if these conditions are carefully carried out, I am convinced of. We in Coorg have been treading our way up to date, carefully and cautiously, more towards finding out the best systems of tapping and curing than of gaining any large result; also our endeavours have been directed towards discovering, on moderate lines, the best tappers, so that we can propagate from these trees for our benefit in the future and thus materially improve our selection.

Taking one of our estates as an example of what we did this past season, we tapped approximately 19,260 trees, an average of 40 times, which gave us 7,486½ lb. of dry rubber or a little over ⅜ of a pound per tree, which we placed on the Market at a profit of 10½*d.* per pound, after covering every expense connected, from the season's cultivation down to the freight to London.

These 19,260 trees would be represented in about 170 acres, composed of approximately 115 tappable trees to the acre, six years old each. Of this I should compute quite another 40 per cent. per acre have yet to arrive at the tapping stage. The average yield per tree will go on steadily increasing and also the cost of manufacture will be considerably lessened now, by reason of our having established up-to-date machinery.

CASTILLOA RUBBER TREES.

The following extract dealing with the tapping test of Castilloa rubber trees carried out by Mr. Wates, Agricultural Instructor for Eastern Portland and Eastern St. Thomas, are taken from the *Jamaica Agricultural Society Journal.*

170 trees were tapped which gave an average of $5\frac{7}{10}$ oz. of latex, at a cost for collection of slightly under 5*d.* per lb. It is also to be taken into account that these trees were not tapped in the early morning when the latex flows most freely, when probably much better results could be obtained.

Mr. Wates also made a tapping test on 160 trees in Portland last October, mostly growing under adverse conditions. The yield there averaged $4\frac{5}{12}$ oz. of rubber and the cost of collection was much the same. All these trees in these two tests were of different ages, from 7 to 12 years.

The tests of these trees were also carried out at the poorest time of the year for good yields; that is, when the trees were in blossom or beginning to seed.

These results are therefore very good, and if trees yield the same on three tappings per annum, the likelihood being that they will do better in September to October and January to February, and if the bark heals quickly, so that tapping can be made on the same place in two years, the growing of Castilloa Rubber even at 2/6 per lb. would be very profitable, when it can be grown where neither coconuts nor bananas will grow well, on poor clay soils. There need never be a coconut nor cocoa tree less; Castilloa Rubber would be an additional crop. And we do want to be as independent of bananas as possible.

RUBBER PRICES.

Rubber shares have shown weakness on some "bear" sales and under the influence of the further fall in the price of the raw material. It would seem that the recent failure of a firm of rubber dealers in the United States has turned out to be of more importance than was originally supposed. No doubt the pronounced weakness of the commodity market here is not unconnected with this trouble, which, as it happens follows upon the heels of the forced liquidation of an extensive account which had been opened for a London operator. Under these circumstances the depression in Rubber shares is hardly to be wondered at.—London Commercial Record.

RUBBER IN THE F.M.S. AND CEYLON.

COSTS COMPARED.

Speaking at the annual meeting of the Vallambrosa Rubber Company, Ltd., the Managing Director, Mr. Wilson Wood, whose long experience and detailed knowledge of planting matters entitles him to a respectful hearing, went into the relative costs of rubber production in the F. M. S. and Ceylon. The general methods of working in the district must, he said, rule the cost of production.

Unfortunately, in the F. M. S. there were adverse conditions which would always make costs heavier than in Ceylon or Sumatra. There was in the first place the 2½ per cent. export duty levied by Government. On the value of last year's crop on Vallambrosa this came to no less than £1·15*s.* per acre. In addition to this, there was a quit rent on Vallambrosa of 50 cents per acre and on Bukit Kraiong and Athlone of 4$ per acre. Then there was the drainage assessment of 50 cents.

When land like Vallambrosa was taken up it was a swamp. No one would have looked at it unless Government had undertaken, which they did, to cut outlet drains, but as soon as the rubber industry began to pay big profits the Government introduced drainage assessment. If this had been contemplated by the Government in the first instance it was their duty to have intimated the fact when the land was purchased. There were also hospital and medical assessments and immigration tax. The latter was an exceedingly heavy burden. Not only had one to pay 4$ for each cooly imported, but for every cooly whose name appeared on the check-roll an annual tax of $8 per head was levied. In recruiting Tamil labour, whole families had to be engaged. The result was that in every gang there was a considerable proportion of old, decrepit coolies and young children who were practically worthless, but for whom work had to be found. A certain number deserted, and there was a percentage of lazy coolies who would not turn out. Altogether the tax mounted up to 2*s.* per working cooly per month, or, say, 1*d.* per day. When one considered that in Ceylon the wage paid was about 6*d.* per day, it would be seen that this was a serious handicap. The total amount paid to Government on Vallambrosa last year in the form of duty and assessment came to £3·10*s* per acre.

It was, continued Mr. Wilson Wood, essential that coolies should be looked after and attended to when sick, but taking the hospital and immigration assessments together, the total collected came to an enormous sum, and one did not require to go to the F. M. S. to know that Government departments were seldom run on business lines. Then there was the fact that though the Tamil coolies employed in the F. M. S. and Ceylon were recruited from the same villages, the former drew from 20 per cent. to 30 per cent. higher wages than the latter.

In Mr. Wilson Wood's opinion, estates in the F. M. S. can never be worked as economically as in Ceylon. Nevertheless, now that it has become a matter of imperative importance to cut down expenses, he feels sure they can be considerably reduced.—India Rubber Journal.

RUBBER CULTIVATION IN SAIGON AND MEXICO.

SAIGON.

Rubber appears in the customs returns of exports to the amount of 96 tons, valued at £17,211. There are now about 170,000 acres of rubber estates in Cochin-China, of which some 32,000 acres are planted with about 4,000,000 trees. The exceptionally long dry season of 1911-12 was rather a severe trial to the young trees, but the damage reported is on the whole less than might have been expected. In a few years' time the export of rubber ought to show a very considerable increase.

MEXICO.

The discovery a few years ago that rubber existed in the bark of the guayule shrub resulted in the founding of a large and important industry. Seven extracting factories are established in this district. Large quantities of rubber are shipped from here annually. However, it seems that the exhaustion of the wild source is inevitable. The plant grows very slowly, and attempts to cultivate it have not met with encouraging results.—Consular Reports.

RUBBER AT PERADENIYA.

The one-year-old stumps planted in July suffered severely from the following drought, in spite of having been mulched and the surrounding soil broken up. It is noticeable on the hill top clearing, that on the level part of it a much greater percentage of both rubber plants and *Tephrosia candida*, with which it is interplanted, have survived the drought. All these plots have been supplied with 2½ year-old stumps from Heneratgoda on August 23rd after good rains and have been well mulched. Of these same stumps planted at Heneratgoda on the 14th of June, only a few have died—of 132, 91 have shoots averaging two feet in height and the rest are mostly alive, but not yet sprouted. The rainfall for June and July was nearly 13 inches.

Of our stumps, one year old, 75 % have died, those surviving only having shoots averaging 6 inches high. The rainfall for July and half of August, since planting, was only 6½ inches.

Plots sown with *Crotalaria juncea*, green-gram and ground-nuts are all doing well.

Canker has been noticed on one of the 8-year-old trees under tapping experiment and the diseased part has been cut out.

In the Ceara plot it is noticed that several trees that had their bark skinned during wet weather in preparation for tapping, have been subject to large areas of bark-rot, followed by small scolytid borers.

Manihot dichotoma. Stabbing 354 trees, 4 days running every fortnight in June and July, only yielded 3 and 2 lb. for each month and as the cooly who tapped them cost Rs. 24 for the two months and the value of the rubber is Rs. 6 these experiments will cease.

D. S. Corlett.

WICKHAM HARD CURE.

We publish an illustration of a consignment of rubber prepared by the Wickham smoke cure apparatus which has been sent to London by the Department of Agriculture in response to a request received from a firm in Mincing Lane which required some for the purpose of investigation and offered four pence a pound premium over plantation. The consignment which weighed 5 cwt. consisted of roll and block from the Experiment Station, Peradeniya, and the old trees at Henaratgoda.

THE OLD HEVEA TREES AT HENARATGODA.

We desire to correct a report that has gained currency that the old Hevea trees at Henaratgoda were blown down by the gale of June 3rd. The trees blown down belonged to the Second Plantation consisting of trees of the second generation and happily none of the original trees were either blown down or injured.

SUGAR AS A SURGICAL ANTISEPTIC.

It has long been known that sugar was a disinfecting and preservative agent. The fact is even said to have been mentioned by Galen. But it is rather novel to learn from *La Revue* that an eminent German surgeon, Dr. George Magnus of Munich, who is famous as a traumatologist, recommends it strongly as a dressing for wounds. All saccharine substances are good, but pure cane sugar or beet sugar is best. Its disinfecting and sterilizing qualities are excellent. It is not injurious to the blood, as has been wrongly believed, and is a better preventive of putrefaction and contamination by microbes than ordinary medical antiseptics.—Scientific American.

AGRICULTURAL EXPERIMENT STATION BULLETINS.

A novelty among Agricultural Experiment Station Bulletins has just been issued by the station of the University of Wyoming at Laramie, entiled "The Identification of the Woody Aster" (Bulletin No. 97, April 1913). The bulletin is printed on a sheet of cardboard, folded once to make four pages. The first (cover) page and the last page contain photographs of the plant in question, which is poisonous and has caused the deaths of thousands of sheep in Wyoming; the second page contains a non-technical description; while on the third page is mounted, in herbarium style, an actual specimen of the aster, in blossom.—Scientific American.

Photo. by H. F. Macmillan.

RUBBER PREPARED BY THE WICKHAM SMOKE CURE.
APPARATUS BY THE DEPARTMENT OF AGRICULTURE.

COCONUTS.

PERADENIYA EXPERIMENT STATION

COCONUT CULTIVATION.

In the plots 53-63 of young seven-year-old plants, 26 are in flower and 26 bearing young nuts. A great improvement is noticeable after being got under cultivation.

Several trees have been attacked by red-beetle (*Rhynchophorus signaticollis*). Three holes were cleared out by cutting open the tree, and after thoroughly scorching the hole, hot tar was applied.

In another case carbon bisulphide was introduced, and on the hole being cut open next day, all the beetles and grubs were found to be dead.

Traps made of the residue after boiling crushed castor oil and removing the oil and water, have been set in the plantation, but so far without result.

D. S. CORLETT.

COCONUTS AT MAHA-ILUPPALAMA.

A fifth round of picking was completed on July 31st. The number of nuts collected was 474 from 93 trees, which gives an average of 5 nuts per tree (or 4 nuts per bunch picked).

Of this quantity

In the cultivated area

86 trees gave 451 nuts, an average of 5 nuts per tree (or 4 nuts per bunch picked).

In the uncultivated area

7 trees gave 23 nuts, an average of 3 nuts per tree (or 3 nuts per bunch picked).

A sixth round of picking was completed on August 31st. The number of nuts collected was 242 from 63 trees which gives an average of 4 nuts per tree (or 4 nuts per bunch picked).

Of this quantity

In the cultivated area, trees 5½ to 6 years old.

56 trees gave 224 nuts, an average of 4 nuts per tree (or 4 nuts per bunch picked).

In the uncultivated area. trees 6½ to 7 years old.

7 trees gave 18 nuts, an average of 2·5 nuts per tree (or 3 nuts per bunch picked).

There has been a steady falling off in the yield for the last three pickings, i.e., June, July and August, as a result of last year's dry season.

This is especially marked in the case of the uncultivated plot. There will now be a marked increase for some months to come. The following figures have been obtained with regard to the copra produced :—

Picking.	Break.	Copra produced.	No. of nuts required per candy (560 lb.)
March and April	413 nuts.	158 lb.	1,463 nuts.
May	488 ,,	200 ,,	1,366 ,,
June	598 ,,	234 ,,	1,431 ,,

25 acres of land are being cleared and prepared for planting in the North-east Monsoon.

G. HARBORD, Manager.

COCONUTS IN GERMAN EAST AFRICA.

It is worthy of notice that in those districts where trade in such products as rubber, ivory, wax, etc., has decreased owing to the centralising influence of the railway, the planting of coconut palms has been undertaken to counteract the loss caused thereby. Thus the value of the copra exports from Bagamoyo increased by 165 per cent., from Pangani by 171 per cent., from Kilwa by 123 per cent. and Mikindani by 119 per cent. Lindi, which formerly imported coconuts from Mafia, now supplies its own wants and has begun to export copra. The exports to Germany increased in 1910 by 343 tons, while the exports to Marseilles decreased relatively to the increased production. The prospects for this crop are good. The soil and climate are admirably suitable, and the palm is said to flourish not only on the coast but even as far inland as Morogoro and Kilossa, 130 and 181 miles distant from the coast respectively. There is an Arab plantation in Tabora, 527 miles from the coast, though probably not of any economic importance. The number of palms owned by Europeans in 1910 was 607,000.—REPORT OF THE VICE-CONSUL OF GERMAN EAST AFRICA.

COCONUT GROWING IN FIJI.

BY H. H. THIELE.

There is a good deal of literature in circulation dealing with coconut cultivation in general, and such places as Ceylon, India, and the West Indies in particular. But, as far as my knowledge goes, very little has been published as regards the same industry in Fiji. It may be stated that there appears to be a considerable difference in the cultivation of the coconut palm in the different countries. This may be due—to some extent at any rate—to different varieties being cultivated ; but at present we are without any proper description or scientific classification of the many species of coconut palms which undoubtedly exist.

1. In establishing a plantation it should be borne in mind that the most suitable soil for coconuts is no doubt found on the alluvial flats or undulating land near the coast or on the banks of rivers near their lower course, where the effects of the tides are felt. As with all plants good soil is perferable, but there is a great deal of contradiction and differences of opinion as to what constitutes good soil for coconuts. In the Madras district, the planters prefer red clay mixed with sand—free from lime and saline substances. At Gopnath (Bombay district) the palm grows freely in solid limestone,

provided a hole about 3½ feet deep by 3 feet diameter is cut in the rock and filled with mould. In most places clayey ground is considered the least suitable. On the island of Taviuni the finest palms are nearly all grown on the slopes along the coast. The soil, which in many places has the appearance of being covered with stones, is of volcanic origin and very fertile—what looks like stone are just disintegrated pieces of lava or scoria, and much lighter than ordinary rock. They have fertilizing qualities, and I have seen in several instances many sickly looking trees recover in a short time by piling these rocks round the foot of their stem—say 4 feet all round it and a couple of feet high.

SEED NUTS.

Selection of seed nuts is an important matter. These should be cut from healthy, heavily bearing trees (not under twenty years old) and not picked up from those fallen to the ground, which may have been cracked by striking some hard substance in their fall. Preference should be given to nearly round, medium-sized nuts with a thick husk. They should be dry and brown —not green—in fact, such as would most likely have fallen to the ground if they had been left on the tree a few days longer. In some places it is advocated—by the sound of the water when shaking the nut—to sort out those which have too little or too much water in them, and reject them. This is hardly necessary or reliable as defects of this description will most likely show themselves when the nut sprouts.

Beds are made in the fairly well shaded nursery by stirring up the soil to the depth of a foot or so, and in these the nuts are placed but not covered up. Two men brought in 200 nuts and placed them in position in the nursery as a day's task. Gathering the nuts one of them would climb the tree with a long rope, pass this over a couple of leaves, fasten it to the stalk of a bunch of nuts, cut the stalk close to the tree, and lower the bunch to the ground. The trees from which they were allowed to gather the nuts I had previously marked with a ring of black paint round the stem. In the nursery I placed the nuts in small squares 10 by 10, in which position they were easily attended to, and watered them in their early stage every few days if no rain had fallen for some time. There was a constant stream of water running through the nursery.

Though it is sometimes difficult to see them, all nuts have three ridges on their outside skin, and some planters in Ceylon advise placing the seed-nuts with the top ridge in the ground for the first four weeks and then turn them over on their opposite large flat side. I did this with some nuts but could see no difference whatever in the development of those and the others, which had rested on their flat side all the time. It seems only reasonable to conclude that nature in this respect is our best guide. When a nut falls from a tree it finally comes to rest on the ground on its flat side and from that position goes on developing.

When the seed-nuts germinated and the young shoots were about 18 inches long, I transplanted them to their final position in the field. According to a writer in "The Cult of the Coconut" it takes 12 months for a growing nut to reach that size. In Taviuni it does not take so long, and nuts gathered in April and May were ready to be planted out in November just before the rainy season.

On the subject of coconut planting, the Hon. Staniforth Smith writes as follows in the "Handbook of Papua" (1909):—

THE NURSERY.

"The nursery is very easily and expeditiously prepared. Select good, loamy, friable soil, and trench it to a depth of 18 inches, divide by paths 6 feet apart, dig cross-trenches 6 inches deep and 1 foot apart, park the nuts, unhusked, in these 2 or 3 inches apart, with the base or stalk end uppermost, which enables the shoot to come up vertically from one of the three eyes of the shell; return as much of the soil as will leave only 2 or 3 inches of the nut above the surface. Water well and cover the beds with 3 or 4 inches of long cut grass. This can be found in abundance in the vicinity. The nuts should be watered from time to time in the absence of rain for a longer period than 4 or 5 days. They should be ready for removal to the plantation in 5 or 6 months. The seed-nuts should be the product of healthy, heavily-bearing trees. They should be ripe but not dry, heavy, and of an oval shape, with thin husks, the three longitudinal ridges of which should not be too prominent."

Before planting out, every vara (as sprouting coconuts are called in Fiji) was carefully examined. Those, which had come on much quicker than the others, and those which were much slower than the rest, were all rejected. By this proceeding I lost perhaps 5 per cent. of the varas, but never as much as 10 per cent. It is not unlikely that excess or want of water in the nut may have been the cause of the too forward or too slow growth of the vara. At any rate, the condition of those 5 per cent. of varas was not normal, and for this reason they were condemned. The rest of the varas were a perfectly even-sized lot.

HOLING AND PLANTING OUT.

Many different opinions have been given on the subject of the size of the hole, in which the varas are finally to be planted, and the distance between them. I used to dig them 2 feet square and 2 feet deep with a distance of 28 feet between them, and this seemed to answer very well. Under certain special conditions, such as an abnormal condition of the soil or irregularity of its surface, other measures may be better. I have seen instances of several rows of trees having been planted much closer on one side of a coconut patch so as to act as a break-wind for the rest, and I have heard of greater distance being allowed between the trees so as to make space for some other plants being cultivated between them. Deeper holes than those I have made are often recommended, but I do not think they are necessary in Fiji.

TRANSPLANTING.

For transporting the varas to their ultimate place in the field, I used rather large shallow boxes with a handle at each end; these would hold about 60 varas as a load. In handling the plants the labourer was warned not to lay hold of the young leaves, which may thus be damaged and the growth of the vara checked. Unless the roots developed in the nursery are very long, there is no necessity for cutting them back. In placing the vara in its hole care should be taken that the roots are not bent or doubled up and should take the same position as when growing in the nursery. The seed-nut itself should be placed so that the top of it is about 6 inches below the surface of

the surrounding soil; this will in time, by rain and cultivation work, be washed in or pushed in, and thus fill the hole entirely. The reason for planting the varas a certain depth below the surface varies according to different writers. One gives it as being done to protect the young plant against strong winds, but it is difficult to see the point in this—the lower part of the stem may benefit a little, the rest of the plant with its large, broad leaves remaining unprotected. Another writer advocates filling up the holes flush with the surface at time of planting. A Ceylon planter was persuaded to do this. He lost 90 per cent. of his young nuts, and reckoned he had made a fool of himself. It is not unlikely that it is beneficial to the vara that the sun and rain gets at the crown of the root at the start. By and by this becomes unnecessary, and by that time the hole has been more or less filled up, and the seed nut covered by the effects of natural processes, as described above.

It is generally recommended to place some kind of manure in the holes in order to give the vara a good start, and thus make up for the check it received when being transplanted from the nursery. All I did some days before planting was to cut, dry and burn some of the grass growing near, and mix the ashes with the soil which was afterwards used in planting.

CARE OF THE YOUNG TREES.

When once the varas have got a good start, there is not much done to them here in Fiji. In other places they are watered for a considerable period, but this—as far as I know—has not been, and is not done here. During more than half the year at any rate it is certainly unnecessary; but we do now and again experience spells of dry weather—you can hardly call them "droughts"—which keep back the growth of every thing. Watering on such occasions would no doubt be of great benefit, and probably bring the trees to bearing nuts much earlier. I would recommend that wherever possible salt (or sea) water should be used in preference to fresh water. The former is generally considered better for the trees and will help to keep down some of the weeds growing round the foot of the stem. In the West Indies the general opinion is that salt does not act as a manure but, when absorbed, it makes the stem of the palm stronger and more supple, so that it will withstand the force of the strong hurricane experienced in that part of the world. If such is really the case, it would be of advantage to planters in Fiji to make experiments with salt or salt water—it would not cost much.

In former years, when the price of copra was only some £ 6 or £ 8 per ton, the expense of watering or manuring (even to a limited extent) was probably prohibitive; but, at present, with the price well over £ 20 per ton, considerably more money might well be spent in getting the trees into earlier bearing and make them produce more and better nuts, than was the case some years ago. It would pay well in the end to do so.

FERTILISERS.

The question of manuring is a very important one and the experience so far recorded seems to vary considerably. In my opinion there are two points which should not be lost sight of. The first is, that chemical manures should not be applied wholesale over an entire plantation, but only to those trees which do not bear a satisfactory number of nuts without it. The second point is, that only sufficient manure be applied to such trees to make

them produce a satisfactory number of nuts without any unnatural exertion. There is a very great difference between manuring cereals and manuring trees. In the former case you manure the soil to obtain certain desired results within a comparatively short time, after which the plant dies. In the latter case you apply the manure to plants which should go on bearing for upwards of a hundred years. There is no doubt about it that you can increase the productive powers of the tree very considerably, but it is at the cost of curtailing the period during which they, under natural conditions, would continue to bear nuts. My opinion is that, when trees look healthy and bear satisfactorily in a natural way, they should be left alone and not encouraged to unnatural large productiveness by artificial means. These latter may be applied to trees which actually require them in order to become productive at all.

I once experimented with a couple of young fruit trees on these lines. They were quite healthy. I manured them heavily and thereby increased their yield to more than double the natural quantity. They went on for two seasons like this, and then died suddenly. I tried my best to save them as soon as I saw their condition, but did not succeed. There was no outward sign of any special disease on roots, stem or leaves; they simply lost all vitality, withered and died in a very short time. The same thing has happened to men when causing flowering plants by artificial means to an unnatural excessive production of flowers. They soon died.—FIJI PLANTERS' JOURNAL.

COCONUTS IN ZANZIBAR.

The palms ordinarily reach the production stage at eight years old, and continue to grow and bear for sixty or seventy years. In spite of the fact that there is at present no copra-drying machinery in either island, all the copra being sun-dried or smoke-cured, the copra produced is superior to and richer than that grown in many other parts of the world. An ordinary consignment, shipped in 1911, was reported on as follows by the London brokers : "The quality is extraordinarily good. It really compares with a copra shipped from the Malabar coast, and would command a ready sale." There is every reason, it is added, why the cultivation of copra should increase in these islands, for it requires less labour and attention than cloves, and is not liable to duty.—FINANCIAL NEWS.

Proposed College of Tropical Agriculture.

Copies of the Detailed Plans of the proposed College of Tropical Agriculture at Peradeniya can be had on application at the Government Stock Garden, Thurstan Road, Colombo.

PADDY.

CULTIVATION IN CEYLON DURING THE XIXTH CENTURY.

By E. ELLIOTT.

(*Continued from p. 205*)

I trust that a consideration of these facts leading to the desire to secure a direct and early return on irrigation expenditure which has been the tendency of recent years may give place to a policy of *festina lente* and contentment to more patiently await development.

I gather from MR. STRANGE's report that Government has taken a small step in this direction by authorising special terms for the Vanni district of the Northern Province which permit of the "Sale of the land at Rs. 15/- per acre and that where the value of the share of the crops paid to Government is equal to the price bid a grant is made." He makes no reference to what water rate is to be charged, but I presume it will be an additional payment; however, even these terms it has been decided, I understand, not to extend to the Karachchi scheme.

Where capitalists of moderate means are prepared to invest their money in opening land, the practice in other colonies, as MR. STRANGE emphasizes, is (by grant on very easy terms) "to help the settlers in the first instance and to wait for results." * Such a policy is doubly necessary in regard to paddy cultivation in the dry zone in Ceylon, where the only eligible settlers to be attracted to the irrigated localities have very limited means, pecuniary or otherwise, beyond the personal labour of themselves and their families.

As fulfilling this *sine qua non* and at the same time meeting the desire prevalent in the Colony to show a direct pecuniary return on the outlay for irrigation, I submit, I trust for favourable consideration, the following scheme which I may add is based on my practical experience in securing the opening of a considerable extent on the Walawe estate.

(*a*) Recognition of the fact that as rule all pecuniary returns arising or due to the construction of such works for this purpose should be entirely credited to the irrigation account.

(*b*) That suitable settlers be granted permits to make † arable (asweddumize) and cultivate moderate extents of irrigable Crown land, *free of charge for the first year.*

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* Thus, in British East Africa, there is no preliminary sale but licence to occupy on annual rental of 10 cents of a rupee per acre under certain conditions as to development and residence within three years where a mortgageable title is granted in the shape of a lease for 99 years at the same rental, subject to increase to 5 per cent. of the unimproved value of the land at end of 35 and 67 years respectively and redeemable at any time in perpetuity, by payment of 20 times the rent.

† As already noted, this view has been acted on in the Punjaub where *nine-tenths* of the rents of irrigated land is credited to irrigation.

(*c*) That the areas in these permits be expressed in sowing extents and that the survey be postponed till the settlers have opened the land, and defined their own boundaries * within certain limits.

That *at the end* of the second year the payment of a water rate of Re. 1/- per acre be required, to be increased to Rs. 2/- and Rs. 3/- at *end* of third and fourth years respectively.

(*d*) That during these years the tenancy should not be determined unless default be made in payment of the water rate or wilful neglect to cultivate.

(*e*) That thereafter the water rate be Rs. 3/- per acre in perpetuity.

(*f*) That at the end of six years, by which time the total receipts will have amounted to Rs. 12/- per acre, a certificate of quiet possession be issued in favour of the holder, on payment of usual survey fees. Until this is done any transfer of the permit to cultivate should be prohibited without the permission of Government Agent.

(*g*) That when required a suitable extent of high land (not suitable for paddy cultivation) be allowed to each settler on which to construct a dwelling and a small garden on similar easy terms, say 25 cents per acre.

(*h*) Where any part of the irrigable area is already private property but not asweddumized (viz : made arable for rice) no water rate should be exacted the first year, but at the end of the second year it should be liable to Re. 1/- per acre and to Rs. 2/- thereafter in perpetuity which should also be the rate from the first on "old land" (viz., already made arable).

OTHER MEANS OF RELIEF TO CULTIVATORS.

Under this scheme there would be an average return of Rs. 2/- per acre for the first six years or allowing 50 cents for maintenance, a net return of 3 per cent. on an expenditure of Rs. 50 † per acre and 5 per cent. thereafter in perpetuity. I believe too that such terms would very materially hasten the taking up of the land and thus secure an earlier return on the outlay, especially in the case of the Karachchi scheme.

Other means of fostering this special branch of agriculture, besides those already treated of, exist and call for some notice in this connection.

But first it is a matter of congratulation that the new Director of Agriculture is reported to recognise that "according to his lights the native cultivator knows his business and it is our duty to try and understand his motives."

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* My practical experience in opening 700 acres of paddy land showed me that the formal rectangular blocking usually done in large surveys of jungle covered land necessarily ignores the contours. Whereas if the cultivators are allowed to clear and open the land, they adapt their ridges and boundaries to the minor undulations. After this, survey can follow as was done at Batticaloa in early days.

† This is I think an outside figure. The Batticaloa works up to 1907 and later the Giant's Tank only cost Rs. 27/- per acre on the land benefited.

In the hope it may further this laudable desire, I will now supply some results of my practical experience, especially acquired during my last six years in Ceylon, when actually and immediately engaged in paddy cultivation and which led me to modify many of my previous views.

Firstly, I think the Director will find that if in any locality the procedure is not in his opinion the best method, he will be given a good reason for the existing practice, and also that the native goiya is perfectly aware of the various ways of working in other districts, but follows the course which *pays him best.*

For instance, it is a favourite reproach by theoretical critics that "transplanting" is not more generally practised. Now the Batticaloa and Hambantota cultivators are quite aware of this mode of sowing, but do not adopt it, simply because there is not a sufficiency of labour procurable to carry it out in the large area each tills in these districts. On the other hand where it is usual, as in Kandy, the proportion of population to the area cultivated is much larger, and as climatic conditions are favourable to the same land being sown twice a year, the saving of time is necessary.

As showing the result of different methods of cultivation, I invite attention to the following table :—

	Kandy.	Matara.	Batticaloa.	Hambantota
(a) Area cultivated	36	46	90	25 000, acres.
(b) Total Population	224*	201	145	105 000 persons.
(c) Crop in favourable year.	800	750	1,000	650 000 bushels.
Proportion b to a	6·2	4·4	1·6	4·2 persons per acre.
,, a to b	·15	·23	·62	·24 acre per person.
,, c to a	22	16	11	26 bushels per acre.
,, c to b	3·5	3·75	7	6 bushels per person.

From this comparison we gather that the Batticaloa cultivator, whose ways are notoriously rough and ready, cultivates four times the extent, and produces twice as much paddy as the Kandyan goiya with his more careful methods and the much vaunted transplanting. Again, as the former only cultivates the same land once as against twice in Kandy the production per acre is much about the same, viz., 11 bushels in each case, the advantage of irrigation in the one case making up for the superior climatic conditions of the other.

In Matara, since the introduction of irrigation, a large extent is cultivated with the mamoty† and there is only limited ploughing, with no transplanting ; but the production is 3·75 bushels per head of the population about equal to that in Kandy, but half the Batticaloa figure, and as a good deal of land is cultivated a second time the production per acre cultivated is about the same.

* Exclusive of coast tenants on estates. I have been obliged to follow the figures of the 1901 Census, not having the later ones, but they are sufficiently accurate for the purpose in view.

† Formerly half the lower parts of the district were cultivated for Maha and the other half for Yala, and the uncultivated portion served as pasturage for the cattle; but with irrigation this custom has been abandoned and consequently there is very little pasturage and the number of cattle have been greatly reduced and cultivation with the mamoty was thus forced on the people.

In Hambantota the production per head is nearly equal to Batticaloa, the high return per acre is due to cultivation a second time of the same land under the irrigation works.

So it will be gathered that in these four typical districts where there are considerable differences in details of cultivation, the results are very much the same, and prove that the native cultivators have each been working on lines best suited to varied conditions and with satisfactory results.

PLOUGHING.

Ploughing is another panacea, the general practice of which is indiscriminately prescribed even by such a competent observer as MR. FRANCIS BEVEN, who would "make dry ploughing invariable." He is probably not aware that this is to a considerable extent done for the earlier Munnari cultivation in Batticaloa during October, this is practicable owing to a little N. E. Monsoon, peculiar to the Eastern Province, locally called "the ploughing rains." The seed is then sown broadcast and ungerminated and left to take its chance, as such land are not irrigable. But when the North-east Monsoon begins this is no longer practicable and "mudding" is resorted to.

Where these ploughing rains are absent, as in the Hambantota district, the ground is so hardened by the three previous months' drought* and hot weather that I found dry ploughing was practically impossible, and there was no course open but to mud with buffaloes.

Another difficulty about ploughing is the want of draught cattle capable of dragging any of the improved ploughs which have been tried. MR. BEVEN, in a letter to the press, states that "MR. DRIEBERG introduced a light iron plough, which was largely used in the Hambantota district, thanks to MR. WOLFF." But the results must have been disappointing as I have seen it stated the cultivators refused to follow up the practice in the following year.

I would further join issue with those who deny the efficacy of *mudding* or trampling process when properly carried out. The practice in the Hambantota district is first to flood the field for a week or so and then trample in the stubble of the previous harvest and the vegetation which has since sprung up during the three months' fallow. Water is then retained in the field for about 20 days, during which the vegetable matter has been nearly all rotted. It is then drained, again flooded and well trampled with buffaloes a second time, and left for about two weeks, when all traces of the former vegetation have entirely disappeared, and it is impossible to walk across the surface without sinking 15-18 inches in the mud. The water is then run off, and the field gone over with the mamoty, levelled and drainage lines traced and eventually sown with germinated† seed.

It seems to me that this process meets the requirements specified by MR. BEVEN, viz. "turning the surface over completely so that the soil should be thoroughly aerated and the surface vegetation destroyed" and the clods completely broken up.

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* The Yala crop is reaped early in August, and the irrigation channels are closed to admit of the annual clearing of silt deposit and repairs till the middle of October.

† The practice of germinating seed under pressure is, I believe, not generally followed in England except on a very small scale to test the quality of small samples.

My matured judgment after many years of study is that in each district the native cultivators of paddy follow methods which are (as MR. BEVEN remarks) "the concentrated experience of ages" best suited to the climatic conditions of his locality and within the means at his disposal and that we cannot suggest any practicable improvement therein.

But it is possible to assist them very materially, not only as already pointed out with cheap land and cheaper water, but in other ways to some of which I will proceed to indicate. on a future occasion.

(*To be continued.*)

MAHA-ILUPPALAMA EXPERIMENT STATION.

PADDY TRIALS JULY-AUGUST.

The complete results of the last trials are given below. The varieties were all 3 months paddy, and the quantity of seed used for sowing in each case was 2 bushels per acre sown broadcast.

Name of variety.	District.	Yield per acre		Bushel weight of grain.	Age Months.
		Paddy	Straw.		
Kantiribalamavi	Galle	48¾ bus.	15½ cwt.	42½ lb.	3½
Heenativi	Ambalangada	43½ ,,	16½ ,,	43¾ ,,	3
Marandanivi	Kurunegala	42 ,,	18 ,,	47¼ ,,	3
Heenativi	N. C. P.	41 ,,	22¼ ,,	52 ,,	3
Suduratavi	Galle	41 ,,	13½ ,,	45¾ ,,	3
Balavi	Heneratgoda	38½ ,,	18½ ,,	47½ ,,	2½
Kirinaranvi	Matara	38 ,,	20¾ ,,	36¼ ,,	3½
Nanduheenativi	Galle	37½ ,,	17½ ,,	42¾ ,,	3
Murungavi	Kurunegala	27½ ,,	14¾ ,,	45½ ,,	3

The object was to find out whether paddy, imported from other districts and grown in the N. C. P would show qualities superior to those of the local variety.

It appears from this experiment that the locally grown Heenativi can hold its own with other 3 months' varieties. I find that the villagers here are taking up the cultivation of Kaivarasamba, a 4 months' variety and one giving a white rice of superior quality.

This paddy has always shown excellent results on the Experiment Station, giving returns of 55 and 60 bushels per acre.

It is always in great demand with my Tamil coolies, who much prefer it to the ordinary cooly rice.

The North-Central Province is, I am sure, capable of producing at a profit really large quantities of rice suited to the requirements of the estate cooly, if only enterprising growers could be found with the necessary capital.

G. HARBORD.

THE CULTIVATION OF RICE WITH MACHINERY.

Mr. F. MAIN, in the *Journal d'Agriculture Tropicale*, deals with the experiments carried out in 1912-13 and superintended by MR. ALAZARD, Engineer to the Indo-Chinese Rice Growing Association. The results of these trials were as follows :—

The small hand-sower proved satisfactory in spite of the inexperience of the native labourers; 0·6 of an acre can be sown in one day, and the rice is distributed in small holes in rows 12 to 16 in. apart and 14 in. apart in the rows. As soon as the grain was up, a marked difference was noted between the parts of the field where the seed had been sown and those where it had been transplanted in the usual native manner. The necessity for sowing on clean land became evident as hoeing was a difficult process on the submerged soil. But whereas the sown rice did not suffer from a sudden rise of the water the transplanting operations had to be interrupted. The sown crop came into ear earlier and gave every promise of an excellent yield.

The crop was harvested in two different ways in order to compare the results obtained by transplanting and direct sowing.

1. A reaper and binder was used to collect the crop sown or transplanted on to 1 hectare (2·47 acres) of ploughed land.

2. The crop sown or transplanted on to 1 hectare of unploughed land was harvested by hand.

The reaper acted as well as the circumstances permitted and MR. ALAZARD deduced the following conclusions from the experiment : Rice selection should be practised in order to obtain a variety with rigid straw which will not lodge easily, and a grain which will ripen more uniformly.

3. Mechanical harvesting is a very easy operation. A binder works well, provided its pace is sufficiently rapid. In the Thai Lai rice-field, where the experiments were made, the soil was dry enough to allow of the passage of a four-ton tractor. The following are the results of the harvest :—

Rice sown on ploughed land	...	1 ton	16½ cwt	per	acre
Rice transplanted on ploughed land	...	1 ,,	3½	,,	,,
Rice sown on unploughed land	...	1 ,,	4½	,,	,,
Rice transplanted on unploughed land		0 ,,	15	,,	,,

The above figures show that mechanical cultivation of rice fields already yields positive results, and it will now be necessary to give the soil a better preparation for the crop and to arrange a system of irrigation which will facilitate hoeing operations.

PADDY HUSK AS FOOD.

MESSRS. V. SUZUKI, T. SHIMANURA and S. ODAKE contribute an article to the *Biochemische Zeitschrift*, in which they give the results of some four years' experiments and investigation in connection with the value of rice-husks as a food. It was noticed by EIJKMANN in 1897 that fowls fed solely on decorticated rice lost their appetite and wasted away and he further found that the condition produced by this diet bore striking resemblance to the human disease known as beri-beri. On the other hand, as soon as they were fed on whole rice they rapidly recovered, and from this the authors drew the conclusion that there is a constituent in the husks which prevents or cures disease. As a result of their investigations, they were able to detect the existence, in the alcoholic extract of the husks which had previously been freed from that, of a nitrogenous and alkaloidal body, to which they have given the name of oryzanin. After a number of feeding experiments with pigeons, fowls, mice and dogs, the authors have come to the conclusion that oryzanin has a very special function in animal nutrition, as important, indeed, as that of the nitrogenous, fats, carbohydrates, and salts. When the animals were fed with artificial foods made up of albuminoids, carbohydrates, fats and salts, but without oryzanin, they could not be kept alive for any length of time : e.g., dogs fed on boiled meat and husked rice had completely wasted away after three or four weeks, while they rapidly recovered when 0·3 gr. of oryzanin was added to their food. It would appear that oryzanin is also found in lesser proportions in many other food substances, such as wheat-bran, bread, barley-bran, oats, cabbages, soy, malt, and horse-radish ; of these barley-bran contains the largest amount, about one-fifth of what occurs in rice husks. From the point of view of the diet and hygiene of people who, like the Japanese, make husked rice the basis of their food, the importance of oryzanin can hardly be overestimated.—INDIAN AGRICULTURIST.

THE CHINESE WOOD-OIL TREE.

This is the subject of a circular by MR. DAVID FAIRCHILD recently published by the U. S. Bureau of Plant Industry, the purpose of the publication being to advocate an extensive cultivation of the tree in this country, where it has been grown in a small way since 1906. The importance of this recommendation is shown by the fact that five million gallons of wood oil (also known as tung oil), made from the seeds of this plant was imported from China last year, and the product is said to have had a revolutionary effect on the varnish industry of the United States. It has, says MR. FAIRCHILD, largely taken the place of kauri gum and has made possible the manufacture of a quicker drying varnish, which is less liable to crack than that made from kauri gum, and has been found of special value in waterproof priming for cement. The tree is climatically adapted for cultivation in the Southern States, and the Department of Agriculture is distributing one year old specimens to *bona fide* experimenters.—SCIENTIFIC AMERICAN.

FIBRES.

RAMIE.

The Botanist in charge of Fibre Investigations in the U. S. A. Department of Agriculture, writing on July 29, says:—

I regard it as very unlikely that a satisfactory market may be found in this country at the present time for ramie fibre prepared by machinery. Many attempts have been made to cultivate ramie in this country, but none of them have attained success, owing chiefly to the difficulty of decorticating the fibre. Of course, you are well informed regarding the experiments with decorticating machines in India, especially at Pandalur. Trials have also been made with decorticating machines in Taiwan (Formosa), where the best ramie fibre is produced, but the results were so unsatisfactory that the growers returned to the former process of cleaning fibre by hand.

There are three or four mills in this country engaged in the work of degumming, combing, and spinning ramie. These mills use China grass prepared by hand in China and Taiwan. The principal products are twines, shoethread, and yarns for incandescent gas mantles. Some of the cheaper yarns are made up into dress goods.

COTTON IN INDIA.

The deputation of the International Cotton Federation to the Secretary of State for India at the end of July last brought out some interesting facts about cotton-growing there.

The present year's crop is expected to bring in £50,000,000 which represents three times the value of the crop 40 years ago. This increase in quantity, as well as improvement in quality, is to be largely attributed to educational work and better co-operation between Government and the growers and spinners.

The fact was brought out that Germany consumes 10% of the Indian crop, or 6 times more than England. The comparatively coarse quality of Indian cotton suits the German trade.

It was further pointed out that what Indians should endeavour to do is to increase the ouput of medium quality and not so much to grow cotton for fine numbers.

One member of the deputation expressed the opinion that the present output of 6,000,000 bales should before very long rise to 10,000,000. This would appear to be an over-sanguine prediction.

We learn from a memorandum by the Director of Agriculture, Madras, of the extraordinary yield of Cambodia Cotton, which, in his opinion is, if grown on suitable land, properly cultivated and honestly sold, the most profitable of all cotton that is of course in India. He instances the case of a plantation on red soil land near Madras which yielded a gross return of Rs. 374/- per acre.

C. D.

FIRST FORECAST OF THE COTTON CROP IN BURMA, 1913-14.

MR. H. M. S. MATHEWS, Commissioner of Settlements and Land Records, Burma, reports that the area under cotton in the eleven chief Cotton producing districts is estimated this year at 232,259 acres. This is 40,677 acres more than the area as estimated in the first forecast of 1912-13. In the districts from which no forecasts are received the area under this crop is approximately 1,750 acres. Sowings were delayed in Thayetmyo and the south of the dry zone by want of rain, but in the north the early rainfall was favourable and the crop was sown at the normal time. The standing plants as a whole are in good condition.

COTTON IN GERMAN EAST AFRICA.

The following extract is from the Report of MR. NORMAN KING, Vice-Consul, on the Trade, Commerce and General Economic Position of German East Africa for the years 1909-12 :—

The cultivation of cotton in German East Africa can hardly be said to have emerged yet from the experimental stage. It only enjoys one advantage over other crops in that the Government have taken the greatest interest in its development and come to the assistance of the planter. Cotton experimental farms have been established at Mpanganya, on the Rufiji River, and at Myombo, near Kilossa. Similar stations are to be opened in the district of Muansa, Tabora and Lindi. The object of these farms is to evolve a variety of the plant best suited to local conditions and to put a period to the dependence of the colony upon other countries for its seed. Several plantations have begun to plant their own seed with fair success. Considerable assistance is also given to planters by the Kolonial Wirtschaftliches Kommittees, which maintains a depot at Dar-es-Salaam, where agricultural implements may be hired by planters or imported by them at manufacturer's cost. The Kommittee also make advances to planters on their crops, facilitate the carriage of crops from distant plantations and sell them for planters at the best rate in Germany. Cotton was grown on 165 plantations in 1910. No statistics are available respecting the number of plantations occupied solely in the cultivation of cotton ; on many sisal and rubber plantations it is grown as a catch crop during the early stages of growth of the plants and trees.

On a few plantations steam ploughs have been employed. Most of the planters are compelled to have resort to manual labour as the prevalence of the tsetse fly renders the employment of oxen impossible. This is a serious handicap, as manual labour is not only very expensive but is said to be insufficient for a proper treatment of the soil. There are 13 cotton growing districts, of which the chief are Morogoro, Lindi, Bagamoyo, Moschi and Muanza, though in Moschi a great deal of the cotton has been given up recently in favour of coffee. Exports are made exclusively to Germany. The acreage under European cultivation in 1912 was about 14,500 acres, on 6,000 acres of which cotton was grown as a catch crop. Egyptian varieties are mostly planted. Caravonica has been almost entirely abandoned owing to its liability to be destroyed by parasites. The planting of American Upland has been resumed again recently.

The exports of cotton (including native-grown cotton) were, during the years 1908-10 :—

			Tons.	£.
1908	...	...	270	12,471
1909	...	...	519	22,023
1910	...	...	622	37,564

The 1912-13 crop is estimated at 8, 500 bales.

COTTON PROSPECTS OF THE UGANDA PROTECTORATE IN 1913.

The following extracts are from a leaflet written by S. Simpson, Director of Agriculture, Uganda.

Cotton is the most important crop of the Protectorate. Last year the cotton exports, exclusive of cotton seed, were valued at over a quarter of a million sterling, and although it is purely a native industry, the prospects of the crop are of vital importance to every resident European, no matter what his vocation may be.

The cotton seed distributed this year is more than double the quantity given out last year, and the largest increase in distribution has been in the Eastern Province where cotton grows well, and gives a good return. The total number of cotton seed distributed in 1913 amounted to 12,101 bags as compared with 5,863 in the preceding year.

The moving of the next cotton crop will be a serious strain on every organization in the country, and arrangements towards coping with it must be started immediately. In the past the cotton has been disgracefully handled after leaving the hands of the growers owing to the lack of transport facilities, storage accommodation, and the absence of ginneries in the cotton growing districts. Improvements are gradually being made in the right directions, but much yet remains to be done before facilities for dealing with the crop are in any way commensurate with the value and quality of Uganda cotton.

The growers are trained to separate the clean cotton from the stained at the time of picking, and to market the dirty cotton at the end of the season. To encourage this, buyers must discriminate in price at the time of purchase, and gin and bale the different qualities distinct from each other. Unfortunately some of the natives still use fibre for bundling their cotton and tying the mouths of sacks.

This fibre must not be permitted on any account to get into the ginned cotton, as it ruins the carding machinery of the spinner.

The first 176 bales of this season's crop have been sold at 9·25*d.* per lb. or 2·40*d.* above "middling" American. It will thus be seen that Uganda cotton is of good quality, is steadily improving, and therefore well repays for care and attention in handling, ginning and baling. It is my earnest desire to see all the present season's cotton crop cleared out of the country as soon as possible.

In the past, much cotton has been kept over to the next season owing to force of circumstances, but the only way to anticipate the new crop with hopes of success is to export this season's crop with the least possible delay, and the mature plans for coping with the new crop immediately it is ready for handling.

INDIAN COTTON

The *Indian Industries and Power* for August has an article on the Growing Value of Cotton Production in India from which it appears that Japan is now the chief purchaser of Indian cotton having taken in 1911-12 only a little less than 50 per cent. of all total export of raw cotton. The following table gives the destinations of the cotton exported for the five years 1907-8 to 1911-12, the unit being 1,000 :—

Country.	1907-8	1908-9	1909-10	1910-11	1911-12
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Japan ...	2,245	2,226	3,303	2,852	3,496
Germany ...	1,927	1,179	1,338	1,391	891
Belgium ...	1,198	910	1,073	1,095	774
Italy ...	1,065	852	943	1,100	672
Austria-Hungary ...	626	382	694	682	471
United Kingdom ...	438	356	518	568	418
France ...	558	390	410	388	291
Spain ...	208	168	197	317	128
China ..	138	220	346	159	88

Roughly speaking of the cotton grown in India one-half is exported raw, a quarter is exported as yarn, and a quarter meets the local demand.

COTTON-GROWING IN SICILY.

The writer, A. Brazil, draws attention to the fact that, owing to the injury caused to the bean crops by *Orobanche speciosa*, it is advisable to grow cotton in the place of these legumes, and he enumerates the advantages to be obtained by re-introducing the crop in Sicily. He points out that cotton, cultivated as a summer crop is of great importance in the rotation, for it does exhaust the land and necessitates repeated hoeings which prepares the soil for wheat. Further, though cotton does not increase the stock of nitrogen in the soil like beans, it scarcely removes any of this compound : moreover it should not be forgotten that cotton cakes form an excellent cattle feed and might be substituted for summer forage which is very scarce in Sicily.

The fertilizing experiments described by the writer were carried out on land belonging to the Colonial Gardens for the purpose of determining the effect of different manures. This land is well adapted to such experiments, as the soil, both in its mechanical and chemical composition, is typical of Sicilian soils suitable for cotton growing.

The conclusions drawn are as follows :—

Nitrogenous manures considerably increase vegetative growth but cause the crop to ripen later. They are to be recommended in the case of poor soils, hot climates, and very early varieties of cotton which exhibit more lateral development than growth in height. The soils of Sicily are nowhere poor enough to necessitate the use of nitrogenous manures especially as the latter have a bad effect upon the technical qualities of the lint.

Phosphatic and potassic fertilizers cause the crop to ripen earlier and increase the weight of the lint. Their influence on vegetative growth is negligible compared to that of nitrogenous fertilizers. The crop being riper is more easily harvested, and the manures also raise the quality of the lint. Phosphatic compounds are only efficacious if they are applied before the rainy season.—Monthly Bulletin.

CULTIVATION OF JUTE.

Jute is derived from two species of Corchorus indigenous to Northern India, known respectively as *Corchorus capsularis and C. olitorius*, Linn., the former being the better variety. For the best results, strong, moist bottom lands, the richer the better, are required. A sandy loam which can be worked into a fine seed-bed is the best, as the jute seed is exceedingly small. Stiff clay soils are not very suitable, as it is impossible to get them into the fine friable condition which the plant requires. In India jute is extensively rotated with rice, as it was long ago ascertained that cropping with jute exterminated those weeds whose burden makes the rice planter's life no sinecure. It is there held that some quality in the jute plant is inimical to weed growth, but the probable cause is the smothering out of weed life owing to the rapid growth and dense shade afforded by the jute. It is also of interest to note that in the Philippines the crop appears immune to the attacks of locusts.

Drought is prejudicial to success and, on the other hand, the young plants are very sensitive to moisture at the root, hence floods at the early stages are detrimental. It is not aquatic in the way that rice is.

The seed is broadcasted at the rate of 10 lb. per acre and lightly covered by means of harrows. When the plants are about a foot high they must be thinned out to distances of 4 inches apart. If allowed to grow closer, the plants get weak and thin.

Flowering occurs about four months after planting, and it is at this stage that the stems furnish fibre of the finest quality. Left until the seed has fully matured, the yield is considerably increased, but at a sacrifice of value. Cutting is done with a sickle; but demonstrations have shown that a vast saving of labour results when the mowing machine is used.

The crop should be cut close to the ground and allowed to lie in small heaps for a couple of days, when the leaves drop freely. They are then carried to the waterside for "retting," which is effected in stagnant or running water by placing the bundles, butts outward, into the water and weighting them down with loaded planks.

A quicker fermentation and speedier completion of the finished product is obtained in stagnant water, but a more brilliant and higher-priced fibre is obtained when "retting" in flowing water.

When the pulp slips freely, the process of fermentation has sufficiently advanced, and the process of decortication is then easily effected by a workman entering the water, gathering a bundle of stems, and beating them upon the surface of the water, when a bundle of pure fibre is left. This is washed in clean water, exposed to the sun to dry, and packed in bales of 3 or 4 cwt. when the article is ready for market. If properly prepared, the fibre should be several feet long, of a bright brown colour, and of a glossy appearance.

Returns ars naturally variable according to soil and weather conditions but a fair and conservative average of value for India has been taken as £12 per hectare (approximately 2½ acres), or about £4 16*s.* per acre.

EXPERIENCE IN NEW SOUTH WALES.

In the early days of the Department's history directions for sowing seeds of jute were issued, and small packets of seed supplied, to various farmers on the North Coast.

The districts in which the crop was most successfully grown were Alstonville, Ballma, Boat Harbour, Byron Bay, Condong, Cooper's Creek, Coraki, Coramba, East Kempsey, Grafton, Marlee, Murwillumbah, Pimlico, Pokolbin, Stuart's Point, and Tintenbar. In places it grew to a height of 10 or 11 feet, and several fine samples of fibre of good quality, both as regards texture and appearance, were prepared.

Fear was expressed at Byron Bay that the plant might become as great a curse to the district as *Sida retusa* (a somewhat similar fibre plant growing all over the Richmond and Tweed districts and classed as a noxious weed), and it was therefore destroyed.

CONCLUSIONS.

From the facts mentioned it is obvious that while there are good grounds for believing that the crop can be grown in New South Wales, there is little cause for cherishing the ambition of establishing the industry. The fact that so many other countries with the unquestionable advantage of similar climate and cheap coloured labour have failed to assail the apparently impregnable position of India as the chief producer of jute, leaves little ground for anticipating that Australia can ever attempt the possibility of supplying even a tithe of its own needs.

Under any circumstances the labour involved is the heaviest item as much of it cannot possibly be replaced by machinery and the process of "retting," as already outlined, does not appeal to Australians as a suitable outlet for their energies.

For first-class land, on which alone jute will thrive, the prospect of obtaining a gross revenue of £5 per acre is not likely to displace dairying or the growing of maize and lucerne.

Above all, it is obvious that very considerable amounts of capital would be necessary for mills and plant to handle the raw product (as in the manufacture of cane and beet sugar), extensive areas would need to be laid down to the one crop, and a guaranteed output arranged for.

In the end there could not possibly be any reduction in the cost of the bags for the farmer or bales for the wool-grower, which would be the only justification for initiating the industry.—THE AGRICULTURAL GAZETTE OF N.S.W.

COTTON GROWING IN QUEENSLAND.

There are large areas of land in Queensland and the Northern Territory where cotton might be grown profitably were it not for the difficulty in obtaining sufficient cheap labour. The high wages paid to labourers relieve their families of any necessity to work, and hence the cotton picking, which ought to be done by the women and children, becomes highly paid labour. Efforts to obtain machinery to do this part of the work have been unsuccessful. Australian cotton is reported to be worth from eight pence to a shilling a pound, while in quality it is as good as Egyptian cotton, or better. But for the labour problem, it might become a very valuable asset to the country.—UNITED EMPIRE.

TEA AT PERADENIYA.

The yield for the month of July has been 3,950 lb. at 6¼ cents. All the plots have now been pruned except the Manipuri Indigenous plots, which having been pruned last in December, 1911, still continue bearing well.

Plots 141-143 and plots 151 and 152 have been tipped, three months after pruning.

D. S. CORLETT.

SOILS.

CROP ROTATION AND SOIL BACTERIA.

That a change of crop, as in a rotation, is of advantage may be regarded as an agricultural truism, and the reason is considered to be that crop requirements for plant food are not the same, so that whereas one crop may make the greatest demand on the nitrogen in the soil, the succeeding crop will require more phosphate and potash. Thus, a cereal crop will take most nitrogen, while the root crop calls for more phosphate, and there is, of course, the further advantage that the cultivation of the land for the root crop helps to clear the land of weeds.

Now, however, it is claimed that the change of crop stimulates bacterial life, and from this point of view the system of different rotations will have to be considered more carefully. A series of experiments have been made, and are being continued in America to throw light on the problem, and, meantime, the following conclusions have been arrived at :—

1. The rotation of crops caused the development of greater numbers of organisms in the soil and of greater ammonifying, nitrifying and nitrogen-fixing power by the soil than continuous cropping either to corn or to clover.

2. Greater numbers of organisms, and greater ammonifying, nitrifying and nitrogen-fixing powers were found in a soil under a three-year rotation of corn, oats, and clover than in a soil under a two-year rotation with clover, cowpeas, or oats turned under as green manure.

3. The use of a green manure in a two-year rotation did not always increase the number of bacteria or the ammonifying, nitrifying and nitrogen-fixing powers of the soil, and it is suggested that the explanation may be sought in the moisture factor or it may be found in the introduction of such large amounts of organic matter.

4. There was an indication that the crop present on the soil was of more importance from the bacterial standpoint than the previous cropping of the soil.

5. The ammonification of dried blood and of cottonseed meal did not always run parallel.

6. The nitrification of dried blood and of ammonium sulphate proceeded almost parallel.—Fiji Planters' Journal.

SOIL STERILIZATION AND FERTILITY.

The increased yields both of flowers and fruits which are obtained by the partial sterilization of the soil, at all events in the cases of such plants as Tomatos, Cucumbers and Chrysanthemums, suggest that this simple expedient will come more and more into general use. In the hope that those who have the facilities will carry out experiments in partial soil sterilization, we give

briefly an account of some of the most recent observations which have been made by Messrs. Russell and Petherbridge at Rothamsted, and we would suggest that among the plants in which similar experiments might be tried with advantage are pot Roses and Carnations. In suggesting cautious experiments with these plants we are influenced by the fact that in the case of Chrysanthemums partial sterilization appears to result undoubtedly in the production of larger and earlier flowers. If similar results are to be obtained with Roses under glass a definite encouragement will be given to the cultivation of these popular flowers. The advisability of attempting the application of the method to the cultivation of Carnations is also evident. In many places these plants suffer very considerably from an obscure leaf disease, apparently due to a bacterium. If the plants respond to partial soil sterilization by a more rapid growth in their earlier stages it may be that, as happens often when they are cultivated under favourable conditions and in the open ground, the Carnations will "grow out" of the disease. The more cautious experimenter may prefer to work with soil which has been only very partially sterilized—for example, by heating to 55° C. (131° F.) When plants are grown in soil previously heated to this degree the initial retardation which occurs frequently in the growth of plants in soil heated to boiling point is either nothing at all or only slight. But the final result is less remarkable than that obtained with plants grown in soil heated to 100° C (212° F.). The increase of yield obtained in either case appears to be due to an accumulation of ammonia in the soil. The partial sterilization serves to destroy the nitrifying bacteria, and in the absence of these organisms ammonia is not oxidised to the form of nitrate. This reserve of ammonia may be held to act in two ways, first as a plant food and second as a stimulator of growth.

Since, however, heating to 55° C, suffices to destroy the nitrifying bacteria, it is not at present clear why heating the soil to the higher temperature should have such a much more marked effect on plant growth. No doubt the higher temperature causes more drastic changes in the chemical composition of the soil, but the way in which the changed chemical constituents affect growth is at present a subject only of conjecture. The experimenter must be prepared to discover an initial checking of growth in the plants grown in soil sterilized at 100° C.; but this check does not endure, and is succeeded by a phase of remarkable activity on the part of the plant. Moreover, instead of this activity leading to "leggy" growth, it results in the case of Tomatos, Cucumbers and Chrysanthemums in the "stocky" habit which the grower associates always with perfect condition.

So far none of the antiseptic substances, toluene, formaldehyde, etc., have given such striking results as are obtained by sterilization by heat at 100° C. Speaking generally, it may be said that the effects of these substances are between those of heat at 53° C. and at 100° C. Finally, as illustrating the advantages of soil sterilization in the case of the Tomato, we may mention that the authors cited already have demonstrated that these plants flower sooner, continue in flower longer, and bear more, earlier and sweeter fruit than the controls grown in untreated soil. Analyses of the plants show that these differences are not to be attributed solely to differences in the rate of

absorption of nitrogen, for the plants grown in partially sterilized soil are richer not only in this element, but also in phosphoric acid than are those cultivated in the ordinary manner. To what this increase in intake of phosphoric acid is due is not clear, though it is by no means improbable that it is the result of the large production of fibrous feeding roots which occur in sterilized soil. This may in turn be the result of the earlier check in growth, for we remember observing that when leguminous plants are grown in soil containing the nodule organism, their roots, becoming infected, suffer a check which is followed very soon by a very rapid and luxuriant formation of lateral roots. The physiology of partial sterilization is, however, still obscure. What is patent is that those who are concerned with practical horticulture can do a notable service by carrying out and recording experiments on partial sterilization with a large variety of the plants in general cultivation. To make such experiments of general value it is necessary to grow plants in untreated soil side by side with others in soil which has been treated, to compare them with one another, and to put on record any noteworthy differences. Above all, it is necessary in carrying out such experiments for the operator to have no prejudice either for or against the method, for it is a commonplace that nothing is so readily seen as that which the mind wants to see.—Gardeners' Chronicle.

INOCULATION OF SOIL FOR LUCERNE.

In November, 1912, lucerne was sown on three plots (a) non-inoculated; (b) inoculated with one-year-old soil; and (c) inoculated with the soil in which lucerne had been growing for three years. For some time all three plots were very similar in appearance, but on April 6th, 1913, while the non-inoculated plot had a decided yellow colour, the other two plots looked exceedingly healthy. The one-year-old soil gave as satisfactory results as the three-year-old soil.—Journal of the Board of Agriculture.

WHAT IS SOIL FERTILITY?

The fertility of a soil may be defined as its capacity for production. This is a wide definition and needs elucidation. If a soil is to produce it must possess certain mechanical properties, and it must contain the food requirements of plants—of which the three principal are, of course, phosphoric acid, potash, and nitrogen. We are not going to venture upon a comprehensive disquisition on all the qualities that make for fertility in a soil; our object is simply to give readers—and maize growers in particular—an idea of the more important aspects of the subject. The principal mechanical properties, then, to which we have referred are the ability of a soil to hold moisture, its capacity for drainage—i.e., in order that it may not become water-logged—and its texture, which must be such that air can be freely admitted. On the one hand, soil that is of too clayey a nature—which is inimical to drainage and to the admittance of air—must be rendered more friable by

dressings of lime ; while on the other hand soil that is too sandy, and thus unable to hold a sufficiency of moisture, may be improved in "body" either by dressings of farmyard manure or by the ploughing under of a green crop. A clay soil, too, is greatly improved in mechanical condition by the addition of farmyard or green manure.

This brings us to the consideration of the soil's content of plant food. For whilst we are improving the mechanical condition of a soil by the addition of an organic manure, we are at the same time more or less enriching it in plant food. This applies more so in the case of farmyard manure, which contains most of the constituents required by plants. Conditions in this country, however, are such that only in a few cases is the application of farmyard manure a feasible proposition. There are, it is true, a few maize growers who are busy thus manuring their lands, treating the fields in succession year after year and beginning again after the circle has been completed. For the majority, however, the practice of green manuring will commend itself as the most practicable. In the case of maize growing, of course, this means that one field each year remains idle, but there are few farms in this country where all the arable land is under crop.—Agricultural Journal of the Union of South Africa.

STONE *vs.* BRICK SILOS.

Stone for silo walls requires to be roughly squared, otherwise good bonding cannot be made. The walls would need to be from 14 to 18 inches thick, and it would require not less than 2 cubic feet of mortar for every 25 cubic feet of masonry. The mortar should be made of 3 parts sand to 1 of unslaked lime, and when required for use mix 1 part of dry cement with 10 parts of lime mortar.

A brick silo requires the walls 9 inches thick, set in similar mortar, and plaster on the inside only with a ½ inch thickness of 3 to 1 sand and cement mortar, similar to an under-ground tank.

The comparative cost would be, with bricks at 30*s.* per 1,000, in favour of the brick silo, as the labour at current rates for the stone work would amount to more than the cost of labour and material for the brick silo. I should advise that the brick silo be built.—A. Brooks in the Agricultural Gazette of N.S.W.

DAIRYING.

MILK FAT IN MILK OF AYRSHIRE COWS.

The following are the conclusions to be drawn from the Supplement published with the August issue of the Journal of the Board of Agriculture on the "Correlation between the percentage of Milk Fat and the Quantity of Milk produced by Ayrshire Cows":—

1. That after allowance has been made for the varying age and duration of the lactation period of the Ayrshire cows under examination, the milk of cows which gave the larger average weekly yields of milk shows a definite and appreciable tendency to be poorer in milk fat than the milk of cows which gave lower average weekly yields.

2. The duration of lactation had no significant influence upon the average percentage of milk fat produced.

3. The percentage of milk fat showed a slight, but definite tendency to be lower in the older than in the younger cows, after due allowance has been made for the average weekly yield of milk.

4. Taking the herd as a whole, the duration of the lactation bore no relation to the average weekly yield of milk produced by cows.

There is thus no evidence, in the case of these cows, of a selective action in favour of retaining in milk those cows that gave a better average yield of milk than others.

5. In the herd under examination, the older cows show a definite and appreciable tendency to give larger yields of milk than the younger cows. This may possibly be due partly to a selective action in weeding out cows which proved unpromising as regards their milk yield when young, and partly to a physiological tendency for older cows to give better yields than younger ones.

6. The duration of lactation has possibly tended to be longer in older than in younger cows, although the evidence on this point is not quite definite.

It is supposed that the average age and duration of lactation remain unaltered, it appears possible to select a herd with an average yield of nearly 800 gallons per cow per lactation (as compared with the 1909 average yield of 637 gallons), without reducing the average percentage of milk fat produced in the herd as a whole below 3·58 per cent., as compared with the present average of 3·68 per cent. It must be borne in mind, however, that while this result may be regarded as the most probable, in the long run the certainty of attaining it diminishes when only a small number of cows is being dealt with, and increases proportionately with the number of cows in the herd in which the policy of selecting cows with higher milk yields is pursued.

MILKING THREE TIMES A DAY.

Experience has shown that cows that give very large quantities of milk will yield more milk if milked three times in the 24 hours instead of twice. If a cow is a large maker of milk, her udder becomes full long before milking time arrives unless she has great capacity in her mammary glands, and hence the animal suffers a certain amount of pain if allowed to go too long without being milked.

Under such circumstances a cow will give larger yields if milked three times a day, and the butter fat test will not suffer. In nearly all the American records the cows that produce such high yields are milked three times a day.—M. A. O'CALLAGHAN in the AGRICULTURAL GAZETTE OF TASMANIA.

CLEARING LAND IN PORTUGUESE EAST AFRICA.

The proportion of land which has been properly stumped in this Territory is very small, says the AGRICULTURAL JOURNAL OF THE MOZAMBIQUE COMPANY. Many of the farms seen along the railway have not been sufficiently cleared to admit of ploughing with oxen, and these necessitate the continual employment of hand labour.

With the increasing demand for native labour throughout the whole of South Africa such a condition of things cannot be much longer maintained. The difference in cost of growing a crop of maize by hand and by up-to-date methods and machinery would in a few years pay for the thorough stumping of the land to be planted.

Taking the wages and food of a boy in this Territory at 25/- per month of 25 working days, and allowing that 50 boys will hoe one hectare (2½ acres) in one day, the cost of preparing land by this method amounts to £2.10.0 per hectare. The Rhodesian Agricultural Department on the other hand estimates that one ploughing with oxen and gang ploughs costs approximately 7/- per hectare and one harrowing costs an additional 2/-. Therefore the preparation of land which is once ploughed and twice harrowed cost 11/- per hectare, against 50/- for hand labour. It is not intended to imply however that one ploughing and two harrowings are sufficient to bring land into such a state of tilth as is desired by progressive farmers, but such tillage will probably afford better preparation for maize than the hoeing which much of the land in this Territory receives.

The yield of maize from land full of burnt stumps and which cannot be properly cultivated, will also be much less than that from cleared land. If, even though aided by fertile soil and nearness to the coast, our farmers are to compete successfully in the production of maize, the clearing of land so as to permit of the use of oxen and gang ploughs is a most important consideration.

The cost of clearing a certain area in this Territory was found to work out at £5 per acre or £12.10.0 per hectare.

THE DOMINIONS.

SUGAR CANE IN BRITISH GUIANA.

An account of sugar cane manuring experiments carried out at the Botanic Gardens in British Guiana during the 21 years 1891-1912.

The experiments were planned to provide information on the following points.

Questions.		No. of replies.
A.—Is nitrogen requisite in a sugar-cane manure ?	...	48
B.—Is nitric nitrogen perferable to ammoniacal nitrogen?	...	24
C.—Is phosphoric acid requisite ?	...	30
D.—Is potash of any use in this soil?	...	24

NITROGENOUS MANURING.

The first general result is that nitrogen in the form of sulphate of ammonia, nitrate of soda, nitrate of lime, calcium cyanamide, raw and dissolved guano, and dried blood, exerts a favourable action on the yield of the sugar-cane, and is undoubtedly the manurial constituent which mainly governs the yield of that plant, and this applies to every variety of sugar cane which has been under trial. When nitrogen is applied in dressings not exceeding 40 to 50 lb. per acre there is practically no difference between the effects of ammonium sulphate, dissolved guano, and nitrate of soda in normal years ; but as a rule the first is considered preferable. Nitrate of lime, cyanamide, dried blood, and raw guano appear to be inferior to these. In the earlier crops of the experiments the best results were obtained by a mixture of one-third nitrate of soda and two-thirds sulphate of ammonia ; but during the latter years this mixture did not prove more efficacious than did either sulphate of ammonia or nitrate of soda alone. When applied in quantities supplying more than 40 to 50 lb. per acre, dissolved guano and sulphate of ammonia are the best sources of nitrogen for the sugar cane on the alluvial soils of British Guiana, the latter being the more economical. The sugar cane makes more effectual use of the nitrogen supplied by 250 lb. of sulphate of ammonia and by about 300 lb. of nitrate of soda per acre, than it does of that supplied by heavier dressings. On the whole, dressings of from 2 to 3 cwt. of sulphate of ammonia per acre appear to be the most certainly profitable applications of nitrogen, although in favourable seasons the use of the still higher proportions has proved useful.

EFFECTS OF PHOSPHATIC AND POTASSIC MANURES.

The application of phosphate of lime to the sugar cane gives somewhat increased yields when used with manurings of nitrogen and potash. The increases are higher when the applications are made to plant canes than when added to ratoons. But the values of the increases in yields, except perhaps during the first two or three crops after the land has been placed

under cultivation, are not remunerative. Superphosphate of lime appears to be the best form of phosphate to apply to long cultivated cane lands which have their subsoil water alkaline. New lands are preferably treated with basic superphosphate, or with basic slag, the former of these in our trials having given somewhat the better results ; but basic slag is lower in price and hence more economical to use. Mineral phosphates to give increased yields must be applied to the soil in such heavy dressings that their use is decidedly unprofitable.

The addition of potash when applied either as sulphate of potash or as nitrate, exerted little, if any, effect, the normal weathering of the constituents of the soil setting free for each crop potash in excess of the quantity necessary for the requirements of the plants. This holds good under ordinary conditions of cultivation, where the greater proportion of potash taken up by plants is directly returned to the soil ; but where the canes and cane tops are removed from the land, as in nurseries, it is probable that partial potash exhaustion will take place in the course of a very few crops.—Monthly Bulletin.

THE PROGRESS OF QUEENSLAND.

At the official luncheon of the Queensland Annual National Agricultural Show, Sir W. Macgregor (the Governor) contrasted the conditions prevailing in Queensland at the present time with those of two generations ago, and said that no country in the world could show such educational and industrial advancement. Science, he remarked, was nowhere more uplifting than in agriculture, and he advocated the establishment of a Chair of Agriculture at Queensland University. For general progress, he concluded, Queensland was unequalled in the civilised world.—Financial News.

AUSTRALIA'S GREAT NORTH.

GOVERNMENT SCHEME FOR SETTLING THE NORTHERN TERRITORY

Carrying on the progressive policy for developing the Northern Territory, the Australian Government has made arrangements for leasing large areas of land there for pastoral purposes. It is announced that 55,000 square miles of Crown lands are available, and may be taken up in the near future under grazing licenses. Three special areas are mentioned in this connection : the first in the vicinity of the Roper River, where 30,000 squars miles of territory is open for lease ; the second lies between the overland telegraph line, the Victoria River Downs, and Wave Hill Station, extending over 10,000 square miles ; and the third is situated between the overland telegraph line and the Queensland border, embracing Barkly Tableland, in the aggregate making up 15,000 square miles.

Those who desire to make application for pastoral licenses must forward £1, and additional fees on the basis of 1*s.* for every head of large cattle and 3*d.* for every head of small stock it is intended to graze. Licenses will not be granted, however, unless at least one head of large or four of small cattle are to be grazed on every square mile, except in certain instances, when the controlling officers may indicate the carrying capacity of the land. As soon as the land is surveyed the pastoral leases will be made available, and the tenure will cover periods of from twenty-one years to forty-two years. The holder of a grazing license at present will have preference in making application for a pastoral lease.

In the hope that further free farms may be offered on the same alluring conditions, dozens of preliminary applications are being received daily, and some hundreds of names of those anxious to make their homes in the north now appear on the Departmental registers. Constant inquiries are also being made and received as to the locality in which the next batch of free farms may be situated. No information on this point is, however, available at present.

By advancing money to eligible settlers, to enable them to overcome the initial difficulties of land settlement and cultivation in the Northern Territory the Australian Government is doing something substantial to encourage the development of this long-neglected portion of the Commonwealth. The advances, which are not to exceed £800 for any one settler, are to be for land clearing, purchasing implements, and stocking holdings. Fencing or other material may be advanced to a settler as well as implements, and the cost to be a debt added to settler's other obligations. For the first five years the settler is to pay 5 per cent. interest annually. Afterwards the advance is to be repaid by 25 yearly instalments, together with 4 per cent. on the balance, paid within a month after the due date. If any instalment of principal and interest remains unpaid for three months the board may treat the whole advance and interest as being immediately repayable. If a yearly instalment, or any part of it, is unpaid within thirty days after it becomes due, the board may recover the amount by distress and sale of goods and chattels, or by action in any court.—Financial News.

SOME NYASALAND PRODUCTS.

The following extracts dealing with the cultivation of Tobacco, Coffee, Rubber and Fibre in the Nyasaland Protectorate are culled from the Annual Report of the Director of Agriculture for the year ending 31st March, 1913.

TOBACCO.

The year under review was favourable for early planted tobacco but the later planted crop was more or less a failure through shortage of rain; some of the early tobacco was among the best the Protectorate has yet produced and, as the crop is increasing at a very rapid rate it was probably in the interests of the Protectorate to produce a quality crop rather than a large crop of inferior quality.

The acreage under tobacco for the year under review was 7,411 as compared with 4,507 in the previous year, and the export of cured tobacco from the area first referred to amounted to 2,262,545 lb., which was valued locally at £56,598. 8*s*. 6*d*. showing an increase in the export of this crop to the value of £2,908. 12*s*. 9*d*. or 115, 930 lb. in weight, and the tobacco now being harvested covers an area of 10,496 acres.

The crop for the year under review was easily made and no difficulty experienced in obtaining a large percentage of good ripe bright tobacco but from a planter's point of view it was not altogether satisfactory as the poundage per acre was rather deficient, especially with late planted tobacco; on the other hand the crop was more easily sold than that of the previous season when, on account of little sunshine, a large percentage cured green.

In districts where the main crop is produced from late planting and raised in the later rains tobacco was a decided failure, the precipitation being insufficient to establish or maintain the young plants; this was notably so in parts of Mlanje, but no crop was lost in the highlands through secondary growth caused by excessive rain during the ripening period.

The tobacco industry in Nyasaland is making wonderful progress and considering in 1902 the total export only amounted to 60 lb. as compared with 2,262,545 lb. in the year under review—equal to practically 3 per cent. of the total average amount of tobacco consumed in Great Britain; we may consider that in a few years, when more capital is attracted to Nyasaland, our tobacco industry will become a very important factor in the tobacco markets of Great Britain.

Few crops are more difficult than tobacco to gain a footing with the public, and it is satisfactory to note that our local-grown-tobacco so strongly resembles Virginian grown that it is rapidly absorbed by the trader and judging from the gradual improvement in prices it seems to be gaining in favour with manufacturers.

During the first few years of its progress the local crop was practically all sold to the Imperial Tobacco Company, Limited, and packed at their local factory at Limbe, but planters in increasing numbers are now exporting their crops to London for sale in the open market; and, although a certain amount of risk is entailed through the tobacco going wrong in transit on account of defective packing, this movement is gaining ground.

At the same time the Imperial Tobacco Company, Limited, still continue to purchase about half the crop, and their ready-cash system of purchase, coupled with the advice of their experts, is a great boon to planters, and the present position of the industry in no small measure is due to their activities.

Complaints are received from home with regard to packing, size of bales, etc., and I would strongly advocate the standardising of bales to 2 feet 6 inches × 2 feet 6 inches × 2 feet or thereby, using double canvas for packing. Large bales loosely packed in a cotton baler are most unsatisfactory, requiring more storing capacity and frequently exceeding the required moisture contents of 12 to 13 per cent. Considerable progress has been made during the last year regarding the baling of cotton, and there is still room for similar improvement in the baling of our tobacco.

The revival of the tobacco growing industry in Ireland is being encouraged by the Imperial Government, and in accordance with official reports of the Department of Agriculture and Technical Instruction for Ireland, the Imperial Treasury made a grant of £6,000 per annum for five years expiring in 1913. The total production of Irish tobacco, of much inferior quality to that of Nyasaland, amounted in 1912 to 61,881 lb. as compared with our crop of over two million pounds. Ireland is receiving a further grant of £35,000 to be spread over a period of ten years to carry on the experiment still further.

The Nyasaland tobacco industry has received less assistance than desirable, not even a tobacco expert being attached to the Department of Agriculture, although the possibilities of the Protectorate for tobacco growing are probably greater than those of any other part of the British Empire.

There are many points regarding the selection of seed, packing, etc., on which planters require technical advice; and the same Imperial arguments might be extended to the tobacco industry of Nyasaland as have already been made by those interested in cotton growing in the Sudan, culminating in substantial financial assistance being granted for that project.

The Nyasaland tobacco crop is the largest growth of Virginian tobacco which has ever been produced outside of America ; and, provided this industry is carefully fostered by Government, there is no reason why Great Britain should be wholly dependent on America for this type of tobacco as there are many thousands of acres suitable for tobacco awaiting development on the extension of the railway from Blantyre to Lake Nyasa and the introduction of capital to the country.

COFFEE.

The partial failure of the rains again proved coffee to be the most fickle crop of Nyasaland and the marked increase in export reported last year has fallen from 786,304 lb., valued at £16,381, to 194,704 lb. valued at £4,868, and the acreage from 3,735 to 2,600--a reduction of 1,135 acres.

It is most regrettable that coffee is such an unstable crop in Nyasaland as the quality leaves nothing to be desired, some of the finest consignments of the crop having reached the very high figure of 86/6 per cwt.

A few years ago practically nothing but coffee was exported from Nyasaland, and in certain localities in the West Shire and Blantyre Districts it is still a specially profitable crop in a very wet season unsuited for cotton or tobacco, and for this reason alone it is much to be regretted that the planting community of Nyasaland are rapidly abandoning its cultivation, and unless the industry is revived it will sink to oblivion in a few years.

RUBBER.

Ceara rubber is gradually emerging from the experimental stage, and with the information collected during the last four years a better knowledge of the districts suitable for its cultivation has been acquired, and although the present acreage under crop is smaller than in the previous year it may be assumed that the rubber trees still remaining are more likely to produce profitable rubber than the larger areas originally planted and partly uprooted because of the unsuitability of the environment for its cultivation.

The most satisfactory feature of the year is the gradual increase in the export of cultivated rubber, and this progress is likely to be maintained for some time. The value of the exported crop amounted to £11,003, of which £3,300 represented the value of the cultivated rubber and £7,703 the value of the uncultivated rubber.

The cultivated rubber exported to date is practically entirely the production of Ceara, the Para rubber on the African Lakes Corporation's estate in West Nyasa not having attained an age for tapping, and the total area under cultivation amounts to 8,896 acres of which 7,659 are under Ceara.

The uncultivated rubber is principally the production of *Landolphia parvifolia* which is being successfully extracted by the African Lakes Corporation from the underground parts of the plant by combined mechanical and chemical processes; this variety grows wild in the West Nyasa, Mombera and North Nyasa Districts, and it is satisfactory to note that the quality of the rubber, after it has undergone the special process already referred to, is much superior to the ordinary wild rubber exported from other parts of Africa.

With regard to the cultivation of rubber in Nyasaland it has been proved that the crop is only suitable for areas with a rainfall of not less than 40 inches, and where the soil is rich in humus and highly retentive of moisture. Endosmotic or root pressure has much to do with the profitable tapping of Ceara, and it is only during the months when the soil is moist that the trees bleed and heal satisfactorily, and for this reason the principles of green manuring can be most advantageously applied in its cultivation.

The tapping systems employed for Ceara in the Protectorate are either pricking, herring bone, or vertical ; the former seems most suitable for small trees and the latter for large trees.

On account of the few months during which rubber can be profitably tapped it has been found most profitable to withdraw latex from the same trees six days in the week, rather than on alternate days as is common with Para in other countries, and an experienced native with a small boy for water carrying should tap at least 40 trees per day; the average daily return from this number of trees varying from 3 to 5 years old and with girths of not less than 14 inches at 3 ft. from the ground is from 10 to 15 ounces of wet rubber, which when properly dried yields approximately 50 per cent. of exportable rubber.

The prices realised for Ceara in biscuit or crepe have been highly satisfactory and usually equal to ruling prices for Para at date of sale ; the preparation and marketing of this class of rubber is thoroughly understood by most planters.

For some years there has been considerable controversy and difference of opinion with regard to the best spacing for Ceara, and, after a careful examination of most estates in the Protectorate, during the last four years, the writer is strongly in favour of spacing not less than 15 ft. × 15 ft. On one estate a considerable area was planted 9 ft. × 9 ft. to prove if the conservation of moisture by over-head shade would compensate for the loss of moisture by wider planting, but it may now be definitely stated that 9 ft. × 9 ft. is far too close, the growth being tall, thin and unsatisfactory.

The writer still adheres to the opinion expressed in a previous report that Ceara rubber will prove a paying crop when planted in rich soil in the districts, but the crop is not suited for general cultivation throughout the protectorate.

FIBRE.

During the last five years fibre has been grown on experimental patches at various elevations of the Protectorate.

Those experimental patches show that Sisal and Mauritius fibre both suffer from cold in the higher elevations, and for most profitable results the crop should be cultivated below 2,500 feet.

During the year under review the British Central Africa Company have been working "Krupp's New Corona" fibre machine at Mandimwe in the Blantyre District. As an extractor of fibre this machine has probably no equal on the market, and during the season some 60 tons of fibre were extracted. The quality of the fibre must be considered most satisfactory as it realised the exceptionally high price of £29 5*s* 0*d* per ton on the home market.

The British Central Africa Company have to be congratulated on their enterprise in importing this very expensve machine, and it is trusted that when they re-establish their factory at a lower elevation in the centre of an area of 1,000 to 1,500 acres that a profitable new industry will result.

The Mauritius plants from which the 60 tons of fibre was extracted were very small and the yield of dry fibre $1\frac{3}{4}$ per cent. approximately, which is extremely low. It has been demonstrated that in order to make fibre cultivation profitable in Nyasaland every modern arrangement must be considered to facilitate the economical transportation of the leaves to the factory.

The company already referred to have for several years been experimenting with small machines of various makes all of which have been unsatisfactory, the best turnout of fibre per day obtained with those inefficient machines was 170 lb ; with the "New Corona" 30 cwt. is the average for a ten hours day and if the fibre percentage was higher, 2 tons might reasonably be expected.

The "New Corona" is a very expensive machine to establish but it is undoubtedly efficient, and judging from the past season's work it is not expensive in repairs.

The export of fibre for the year under review amounted to 140,692 lb. valued locally at £1,256, and shows an increase in value of £1,159 over the export of the previous year.

The area under Mauritius hemp amounts to 856 acres and under Sisal hemp 152 acres There is every probability of an extension in acreage during the coming season.

CO-OPERATIVE CREDIT MOVEMENT.

PROGRESS IN BURMA.

All who realise what great benefits the co-operative credit movement brings in its train will derive satisfaction from an examination of the progress achieved in the formation and working of societies in Burma during the year 1911-12. The report on this subject shows that the number of rural societies has trebled since 1910, the total at the date of the report being 721. Unions of societies increased during the same period from 8 to 43, and there were 37 urban societies as compared with 22. The rural societies had a membership of 16,821, and possessed a working capital of Rs. 18½ lakhs. The Unions comprised about 500 rural societies, and the Upper Burma Central Bank which was formed for the purpose of providing finance, has proved so successful in attracting deposits that it increased its working capital from Rs. 6½ lakhs to Rs. 12¾ lakhs, took over the loan business with societies previously carried on by the Bank of Rangoon, and reduced its minimum rate of interest to 4 per cent. for one year. SIR HARVEY ADAMSON approved of the proposal of the Registrar, MR. A. F. ENGLISH, that the Unions, which are proving of great practical utility, should form the ordinary medium for enquiries respecting their affiliated societies. "The system whereby an efficient Union is allowed a cash credit with the Central Bank, thereby obviating the necessity for the prior sanction of the Registrar to loans within that credit required by its affiliated societies," said SIR HARVEY, "should be a most valuable incentive to its increased efficiency, and enable the Registrar to exercise adequate control over a larger number of individual societies than would otherwise be possible." It is noteworthy that the demand for the formation of new societies is rapidly growing. In the Kyuakse district nearly every village already possesses a society, or has applied for one to be formed. —INDIAN AGRICULTURIST.

CO-OPERATION IN PRUSSIA.

A very instructive account of the progress of an agricultural co-operative credit society in Prussia is given in the *Deutsche landwirtschaftliche Genossenschaftspresse*, June 15th, 1913. The Society in question was founded in November, 1900, in the two communities of Herrenhofen and Orschkau in Posen, possessing an area of 2,700 acres and a population of about 600 persons. These two communities were established by the Settlement Commission of West Prussia and Posen, and the inhabitants were drawn from all parts of Germany and even Russia and Galicia, so that the success which has attended the working of a society composed of members with different customs and ideas is all the more creditable. The first settlers came to the district in 1900.

whereupon the society was commenced with 19 members. It is recorded that none of the members had previously heard of a co-operative credit society, and were exceedingly mistrustful of each other. The society however, increased until in 1905 there were 64 members, by which year the settlement scheme was completed. At the end of 1911 the society had 72 members, of which 52 were peasants, and the rest artisans agricultural labourers, teachers, etc. The members' holdings are either small or of a medium size, and no large landowners belong to the Society. Three members have from 74 to 86 acres, and the others have from 25 to 50 acres with the exception of a few who have very small holdings or no land at all.

DEPOSITS.

Very little of the savings of the members were at the disposal of the society in the first years of its existence, as the members were engaged in equipping their holdings. Thus in 1901 the society had £150, and in 1906 £875 in deposits, but thereafter greater progress was made, and the amount owing to the members by the society in deposits in 1911 was £3,800. There were 208 deposit accounts in 1911, compared with 6 in 1901. There are thus three times as many accounts as members. Much trouble has been taken to induce servants and children to invest their savings with the society, all amounts, however small, being accepted. Nearly all the members have a deposit account.

LOANS.

Most, if not all, of the members, did not have sufficient funds to fully equip their holdings, and in addition the harvests in the first two years were very poor, so that the loans by the society were much valued. In 1901, 8 loans were made of the value of £140 ; in 1902, 7 of the value ot 215 ; in 1903, 18 of the value of £525 ; and in 1904, 56 of the value of £1,680. After 1904, the loans decreased both in number and amount, as, by then, most of the holdings were provided with necessary buildings and stock, and further loans were thereafter required by farmers principally for increasing their activities. In the eleven years 1901-11, 214 loans in all were made, of the value of £7,065, of which £4,925 had been paid back by the end of 1911. It is stated that, but for the facility with which these loans could be obtained, many of the farmers would have fallen into the hands of money-lenders.—Board of Agriculture Journal.

CO-OPERATIVE LITERATURE.

We publish the following list of books dealing with Co-operation in Agriculture and Co-operative Banking as being of interest to our readers at such a time as this when the Co-operative Credit Movement is beginning to establish itself in Ceylon:—

	s.	d.
Co-operation in Agriculture, by H. W. Wolff, P. S. King & Son, Orchard House, Westminster, London.	6	0.
Agricultural Co-operation, by G. Radford, Orchard House, Westminster, London.	1	0.

	s.	d.
Rural Denmark and its lessons, 2nd Edn. by RIDER HAGGARD. LONGMANS, GREEN & CO., Paternoster Row, London. ...	6.	6.
A Free Farmer in a Free State, by J. W. ROBERTSON SCOTT, WILLIAM HEINMAN, London.	6.	0.
Agricultural Organisation, by E. A. PRATT, P. S. KING & SON, London.	3.	6.
Organisation in Agriculture, by E. A. PRATT, JOHN MURRAY, London.	1.	0.
Transition in Agriculture, by E. A. PRATT.	5.	0.
The best methods of Organisation for Agricultural Co-operation and Credit by SMITH, Department of Agriculture & Technical Instruction for Ireland. Printed by ALEX. THOM & CO., Abbey St., Dublin.		

CO-OPERATIVE BANKING.

Report on Agricultural Banks, 2 vols. by NICHOLSON (SIR FREDERIC), Superintendent, Government Press, Madras, (price Rs. 3'12'0)		
People's Banks by Dupernex, THACKER SPINK & CO., Calcutta (price Rs. 4) ...		
Co-operative Banking by H. W. WOLFF, P. S. KING & SON, London.	7.	6.
People's Banks, by H. W. WOLFF, P. S. KING & SON, London.	6.	0.
Co-operative Credit Banks, by H. W. WOLFF P. S. KING & SON, London.	1.	0.
Agricultural Banks, by H. W WOLFF, P. S. KING & SON, London.	1.	0.
Village Banks, by H. W. WOLFF, P. S. KING & SON, London.	0.	6.
People's Co-operative Banks, by H. C. DEVINE, CASSEL & CO., Limited, London.	1.	0.
Banks & People, by THOMAS FARROW, CHAPMAN & HALL, LTD., London.	1.	0.
An Enquiry into European Credit Systems, WYMEN & SONS, LTD., Fetter Lane, London E. C.		...
Select Committee's Report on Thrift and Credit Bank's Bill Thrift, WYMEN & SONS, LTD., Fetter Lane, London. ...	0.	6.
Report to the Board of Agriculture and Fisheries of an Enquiry into Agricultural Credit and Agricultural Co-operation in Germany with some notes on German Live Stock Insurance, by J. R. CAHILL, Live Stock.	5.	0.

A LESSON IN CO-OPERATION.

A recent issue of the *Round Table* contains a very interesting description of the wonderful progress achieved by "The Grain Growers' Movement in Western Canada," and shows the tremendous power possessed by any body of citizens animated by self interest. Faced by the neglect of politicians and the apparently unassailable position of the monopolists, they have created an

organisation making themselves independent of both :—

It may be assumed, therefore, that a large part of the grain trade in Western Canada will be controlled by a co-operative organisation of the farmers themselves. But the officers of the Grain Growers' Grain Company, finding that success has followed these schemes, decline to confine their attention to the handling of grain. They have bought a large tract of timber in British Columbia, from which they intend to develop a lumber business with a view to defeating the lumber combines, which are admitted to operate in the prairie provinces. In Manitoba, they have established a flour-selling business in connection with their elevators, and have already reduced the price to the consumer. They propose to extend the system gradually to other supplies, and it is by no means improbable that they will enter upon the flour milling business in the near future. They look forward, also, to establishing co-operative manufactories of agricultural machinery, such as the Labour Ministry is preparing to build up in Western Australia, and, if the Government of the prairie provinces do not create a system of State loans, they meditate entering upon the mortgage business. The writer of the article says :—

"There may be many faults to find with the Grain Growers,' but they must be regarded as the main hope of democracy in Canada, and the spear-head of the reforming forces whose aspiration ought to be to save Canada from the harrowing experiences of her southern neighbour at the hands of an organised and selfish capitalism. They have a clear idea of the goal which they seek, a vast co-operative agricultural community freed from the tyranny of corporations, railways, and the manufacturers' associations, enjoying continuous prosperity under the British flag, and evolving a free, contented yeomanry as a backbone for the population of the Dominion and a saving strength for the British Empire. There can be no greater bulwark for the British connection in Western Canada than the establishment of such a co-operative system in pleasing contrast to the individualistic scramble of the United States."

INOCULATION OF LEGUMINOUS CROPS.

An experiment was carried out in order to ascertain if a new method which has recently been adopted in the preparation of cultures for inoculation purposes got over difficulties experienced in the past. Cultures from the nodules of leguminous plants were formerly kept in air-tight receptacles or absorbed in cotton-wool, earth, etc., whereas in this new method air is allowed entrance after being filtered through cotton-wool.

Six small plots were set out and, on May 25, two were sown with lucerne, two with red clover, and two with white clover. In one case the seed was sown direct ; in the other the seed was first soaked in the culture preparation, and was then air-dried and sown. The crops were cut and weighed on October 4th, and in each case the crop was slightly increased as the result of inoculating the seed before sowing it.—Rept. on the Woburn Field Expts.

POULTRY.

THE SOCIETY AND THE POULTRY CLUB.

The following report of the joint Sub-Committee appointed to consider the proposed amalgamation of the Ceylon Poultry Club with the Society was read by Mr. C. Drieberg at the meeting of the Ceylon Agricultural Society held on 13th August, 1913, and was unanimously adopted on the motion of Mr. De Mel and seconded by Mr. Sturgess :—

The Sub-Committee, after due consideration of the various proposals put forward on behalf of the Club and also of the Society, have come to the conclusion that, while co-operation between the Poultry Club and the Agricultural Society should be encouraged, the interest of poultry breeding will for the present be best served by each body maintaining its independence. With a view to closer relations at a future date the Sub-Committee suggest that the Editor of The Tropical Agriculturist be requested to publish in that journal all items of poultry news, not exceeding four pages, supplied by the Honorary Secretary of the Ceylon Poultry Club, such items together with any other poultry news published in the Tropical Agriculturist to be reissued subsequently as a supplement to the members of the Poultry Club at a charge of Rs. 200 per annum for 100 copies of the supplement monthly to be delivered free in an unbound condition to the Secretary of the Poultry Club for distribution; extra copies to be supplied pro rata.

THE CARE OF THE FARM EGG.

With the view to determining the causes of the enormous loss in eggs, and, if possible, working out methods for its elimination, extensive experiments were carried out in the State of Kansas. The following are the chief conclusions reached. An unheated room in a dwelling house is not conducive to good quality in eggs. The production of spots, blood rings, and rots is favoured by the conditions obtaining during the hot summer months. The greatest deterioration in fertile eggs occurred in the experiments which included a certain amount of natural incubation. Both fertile and infertile eggs taken from straw-stack nests gave the greatest number of spots; this was the only case in which a large number of infertile eggs deteriorated to such an extent as to be unfit for food. Infertile eggs, regardless of where they may be kept, are more resistant of deterioration than fertile ones. The haphazard methods of poultry management on farms are responsible for two-thirds of the total loss in fertile and infertile eggs. The production of the infertile egg seems to be the greatest asset in the attempt to produce high quality market eggs during hot weather. Eggs of high quantity would be

produced and much loss prevented if egg producers would observe the following rules :—

(*a*) Give the hens clean nests.
(*b*) Gather eggs at least once daily.
(*c*) Keep eggs in a cool dry place.
(*d*) Market eggs at least twice a week.
(*e*) Kill or sell mature male birds as soon as the hatching season closes.

H. M. Lamon and C. L. Opperman in Bull. 160; U. S. Dept. of Agriculture.

THE UTILITY POULTRY CLUB'S TWELVE MONTHS LAYING COMPETITION.

The report for the ninth period of four weeks states that the warm, dry weather of June resulted in broodiness claiming a large number of the birds. The results for the nine months show very even laying on the part of the birds ; here and there when a pen started late it has risen a great many places but on the whole, particularly among the leading pens, there has been little variation. During the ninth period there was no alteration in the placing of the first five pens, but Pen 60, White Wyandottes, improved the lead which they gained in the preceding period on Pen 86, Buff Rocks. The scores of leading pens to the end of the ninth period were as follows :—

Order.	Pen No.	Breed.	Total eggs for Nine Months.	Total money Value.		
				£.	s.	d.
1	60	White Wyandottes	941	4	13	10
2	86	Buff Rocks	871	4	12	3½
3	32	White Wyandottes	860	4	5	11½
4	45	,, ,,	819	3	19	11½
5	35	,, ,,	814	3	17	8
6	80	Buff Orpingtons	787	3	17	0¾
7	54	White Wyandottes	829	3	16	10
8	24	Black Leghorns	769	3	19	4

SOUTH AUSTRALIAN EGG-LAYING COMPETITIONS.

The Report of the Department of Agriculture, South Australia, on the South Australian Egg-laying Competitions, 1912-13, gives a full account of the Laying Competitions at Roseworthy and Kybybolite Poultry Stations, which terminated on March 31st, 1913.

In the *Roseworthy Competition*, which was the ninth test of the kind held in the State, the entries were divided into three sections. The first was confined to birds of the Mediterranean breeds, and contained 83 pens of White Leghorns. Thirty-one pens were entered in Section 2, open to heavy breeds; of these 22 were Black Orpingtons, 6 were Silver Wyandottes, while one pen of Salmon Faverolles, one of Langshans, and one of Plymouth Rocks were included. Section 3, described as the "Scratching Shed" Section, contained 20 pens of White Leghorns, and the birds in this section were kept entirely in the house from April to September. The result of the test as a whole is set out below :—

No. of Hens.	Eggs laid.	Average per hen.	Eggs laid by Winning pen	Market Value of eggs.
				£. s. d.
804	146,329	182	1,413	663·11·2
Cost of Food per hen.	Return per hen.	Profit per hen	Average price of eggs.	
s. d.	s. d.	s. d.	s. d.	
5.7·8	16.6	10.10·2	1.1·06 per dozen.	

In the third section, the twenty pens confined to scratching sheds produced 23,354 eggs, and the twenty "open yard" pens of similar breeding produced 23,723 eggs.

At *Kybybolite*, Section 1 consisted of 16 pens of White Leghorns and one of Minorcas; in Section 2 there were three pens of Black Orpingtons, two pens of Silver Wyandottes, and two pens of Plymouth Rocks.

The summary of results is set out below :—

No. of Hens.	Eggs laid.	Average per hen.	Eggs laid by winning pen.	Market value of eggs.
				£. s. d.
204	36,675	179.8	1,530	166.6.2·57
Cost of Food per hen	Return per hen.	Profit per hen.	Average price of eggs.	
s. d.	s. d.	s. d.	s. d.	
5.8	16.3·5	10.7·5	1.1·06 per dozen	

In both competitions any pens from which the eggs did not attain an average weight of 24 oz. per dozen by July 31st, 1912, were deprived of participation in the prize money.

In future the laying competitions will be held at one centre, viz., at Parafield Poultry Station, where the 1913-14 competition is now in progress, the total number, of birds entered being 960.—Department of Agriculture, South Australia.

EGG LAYING.

THIRD VICTORIAN COMPETITION, 1913-14.

No. of Pen.	Breed	Total number of eggs for the 3 months—15th April to 14 July	Position in Competition.
23	White Leghorns	381	1
65	do	361	2
6	do	358	3
61	do	350	4
48	do	342	5
8	do	334	6
11	do	333	7
46	Black Orpingtons	325	8
21	White Leghorns	322	9
68	do	313	10
31	do	309	11
16	Black Orpingtons	306	12
50	White Leghorns	303	13
10	do	302	14
34	do	301	15
35	do	290	16
66	do	283	17
7	do	275	18
37	do	274	19
40	do	272	20
49	do	271	21
47	do	269	22
2	do	261	23
14	do	258	24
43	do	254	25
32	do	252	26
63	do	248	27
39	do	248	
20	do	246	29
41	do	245	30
26	do	244	31
38	do	241	32
25	Black Orpingtons	240	33
67	White Leghorns	237	34
58	do	235	35
45	do	235	
13	Black Orpingtons	233	37
24	White Leghorns	230	38
18	do	227	39
27	do	225	40
5	do	213	41
3	do	212	42
59	S. C. White Leghorns	204	43
22	White Leghorns	201	44
55	do	191	45

No. of Pen.	Breed	Total number of eggs for the 3 months—15th April to 14th July	Position in Competition
52	White Leghorns	183	46
28	do	182	47
53	Black Orpingtons	182	
62	White Leghorns	177	49
57	do	165	50
17	R. C. Brown Leghorns	164	51
12	White Leghorns	156	52
19	do	154	53
44	do	152	54
33	do	151	55
42	do	148	56
56	do	142	57
51	Black Spanish	121	58
36	White Leghorns	118	59
15	do	109	60
54	do	99	61
64	Golden Wyandottes	97	62
30	Black Orpingtons	94	63
29	White Leghorns	89	64
9	do	78	65
60	Black Spanish	59	66
4	White Leghorns	57	67
		15,131	

Journal of Agriculture, Victoria.

HINTS FOR POULTRY KEEPERS.

WATER.

Be sure and replenish the water vessels at least twice a day, morning and afternoon ; better also to do so at noon. Clear, cool water is essential if you would have healthy chickens. It is useful also at this time to put a tea-spoonful of sulphur in the chickens' food twice a week, that dose for twelve half-grown chickens. It will help them to feather and clear their blood. Put Epsom Salts in the water once a week, a dessert spoonful to a quart of water. The dose is regulated by the drinking capacity of the fowls ; chickens drink less than hens.

FOOD.

A common mistake in feeding is to fling the food down thickly in one place ; never do so; scatter it far and wide over grass or trash, so that the birds large or small take time to pick it up, must scrape for it. It is a maxim in poultry rearing to keep the fowls busy.

Another error is not regulating the quantity of food. Fowls are fed at random ; they get too much or too little, seldom just sufficient. Yet nothing is easier than to know how much food must be fed. So much per dozen or score of fowls is not very accurate. The nature of the run that fowls have must be

taken into account. Some fowls have a free run, go where they like and may pick up large numbers of insects and grubs. Or there may be a large number of fowls which have only the chance of getting very little to pick up, because they do not take advantage of the room to wander. In a confined space fowls must have scratching stuff-grass or a manure heap to scrape in. A good general rule is to catch up a fowl and chicken every morning after feeding and feel their crops. If they are half full or a little more, that is enough. If they have a large run they need no more until the afternoon, when the grain can be fed at 3.30 to 4 o'clock. Taking one or two birds at random or those which are observed not to be the greediest, and feeling their crops will prove whether they have had enough. After the evening feed the crops should be completely full but not tight as a drum, with food.

LICE.

In the hot weather, insect life is most rampant. The pinch of sulphur in the chickens' food helps to keep off insects. The roosts should have their ends touched with the lard, sulphur and kerosene mixture, or with Paranaph. The same mixture (lard, etc.) anointed on the back of the head, underneath the wings and on the rump of the fowls, (where the oil gland is) will keep off lice.

All fowls should be inspected now for lice; there are three varieties common on fowls and all cause trouble if plentiful. When fowls roost on trees it is not easy to get them handled. They should then be caught while feeding in the evening. A dusting with Sulphur or Insect Powder can be done by those who will take the trouble. The powder must be thoroughly dusted into the feathers.

INDIGESTION, YAWS AND ROUP.

These are the common troubles in chickens. It is not possible to rear chickens satisfactorily running among old hens. The chickens pick up large grain, and get pecks on the back of the head which, if vicious or repeated often, makes them double up, look sickly and die. Picking up large grains, like corn or oats gives the chickens indigestion. There should be separate coops where the chickens can be fed. These save their costs many times over. When the crop of a chicken is stuffed up and the food won't move try first a half tea-spoonful of water and a small pinch of bi-carbonate of soda; an hour later try a half tea-spoonful of sweet or salad oil, and knead the crop gently after both doses. This generally will move the contents of the crop but if not, after a day or night, repeat another dose of both.

In extreme cases and when one can do simple surgery, and if the chicken is of particular value, take a fine pair of scissors, clip off the feathers or down on the top of the crop, cut open the fine skin underneath, turn the bird over, gently squeeze out the contents of the crop, or take a small spoon and scoop the contents out; put in a little water just coloured pink with Permanganate of Potash, let this run out, and then sew up the outer skin of the crop with fine thread, oil the stitching and put the chicken by itself. Feed only a little soft food for two days and then let the bird run.

A scour of Epsom Salts once a week will ward off indigestion in the stomach and bowels.

Tonic or Condition Powders, the best of which contain charcoal, iron, Epsom Salts, sulphur etc., are sometimes of good use.—Jamaica Agric. Society Journal.

PROFITABLE EGG-PRODUCTION.

The fourth egg-laying competition held at Springvale has recently finished, and it is interesting to note some of the chief features in this connection.

In 1909-10 a pen of White Leghorns scored highest honours, with a total of 1,248 eggs. On 1910-11 Black Orpingtons came to the fore with 1,318 to their credit. In the two last competitions White Leghorns have topped the list with 1,250 eggs in 1911-12, and for the season just finished 1,272 eggs.

As noted at the conclusion of last year's competition the all-round average of the birds competing still improves.

Last year it was pointed out that a perusal of the lists of eggs showed that, as compared with previous competitions, there was no "falling away" in the number of eggs laid in respect to pens at the bottom of the list. In the first competition 28 pens competed, and five of these produced less than 800 eggs each. The second event saw the number of pens increase to 32, and six pens fell below 800 eggs each. Last year the competition had 33 pens, and only two of these fell below 800 eggs. This year the three lowest pens recorded 943. 956, and 983 eggs respectively. This means that the lowest pen in the competition averaged over 157 eggs per bird.

Approaching the results arising from this year's work from another standpoint it will be seen that 19 pens out of the 29, or over 70 per cent. recorded more than 1,200 eggs per pen, which means that each bird in the pens averaged over 200 eggs.* No meat was employed in the diet of the birds competing, but skim-milk and lucerne were provided to furnish protein, which largely exists in the white of the egg. The following table shows the first three pen yields and the lowest for the four competitions at Springvale:—

Highest.

1st year, 1,248, 1,179, 1,855; total, 3,582.
2nd year, 1,318, 1,298, 1,215; total, 3,831.
3rd year, 1,250, 1,201, 1,188; total, 3,639.
4th year, 1,272, 1,261, 1,261; total, 3,794.

Lowest.

1st year, 670, 654, 410; total, 1,734.
2nd year, 661, 614, 614; total, 1,889.
3rd year, 801, 794, 632; total, 2,227.
4th year, 983, 956, 943; total, 2,882.

It is at the tail end where any improvement will be noticeable, and we find that the lowest pen yield in the 4th year more than doubled the number of eggs laid in the corresponding pen entered the first season.—Agricultural Gazette of Tasmania.

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* The grand total of eggs laid by the 29 pens competing was 34,137, or an average of 1,177 eggs per pen, and as there were six birds per pen, the average of each bird stands as high as 196 eggs. No substitution of birds was practised in this competition.

POULTRY NOTES.

(*Contributed*)

This is the first number of the Club Magazine issued in conjunction with the Poultry Section of the Tropical Agriculturist and the Club may congratulate itself on having an excellent practical magazine

The Agricultural Society prints in its Journal four pages of local news supplied by the C. P. C. Editorial Secretary of this Poultry section together with its usual Poultry Notes, the Club paying Rs. 200/- a year for 100 copies a month. The printed matter will be sent to the Secretary who will have it bound up and issued to members.

To Mr. M. J. Cary is due the credit for having formulated this scheme, which was passed through at the last Committee Meeting of the Agricultural Society.

It will be interesting to see what the Agricultural Society intends doing as regards poultry-keeping in Ceylon. Utility poultry farming will undoubtedly be its chief interest. Up to date, Government have not taken up the question of improving the "feathered world" in this country, and any improvement there may be in the village, "kolis" has been brought about by the Ceylon Poultry Club whose members have gone to the trouble and expense of importing pure-bred poultry. In India there are Government Poultry Establishments and it is to be hoped that a "farm" will be started in Ceylon. Why should not such a farm be established in connection with the new Government Dairy?

The Ceylon Poultry Club will help in many ways, as certain breeds do not thrive in this country, and also the feeding of fowls requires close attention if one wants healthy poultry and plenty of eggs.

There are few foods in Ceylon on which fowls can be exclusively fed, and if an establishment were run on purely utility lines, i.e., eggs and eating fowls, the cost of feeding on imported food, such as wheat and oats, would absorb most of the profits. In Australia we read of fowls showing a profit of 9*s*. a head per annum but there they are fed on food grown in the country, which could not be the case in Ceylon, where the staple food may be said to be paddy. Kurakkan although excellent as a grain food is apparently little used.

If this question of feeding be taken up by the Agricultural Society it would be of very great interest to poultry keepers. There are at present a few poultry establishments in this country that are run for "profit" successfully, and the fowls are fed on imported foods. But the value of live stock, cockerels and pullets, is very much higher than it should be. A pure-bred cockerel can be sold for Rs. 7/50 to Rs. 25/00, whereas their real value in England might be 3*s*. 6*d*, to 10*s*. The majority are really only fit for table purposes, but as there is a demand by the public for these fowls they sell above their value.

There are many more questions to be proved before anyone would care to risk a "utility" farm in Ceylon (unless assisted by Government) such as housing, diseases and their causes, etc.

Fowls are undoubtedly more liable to disease in Ceylon than in England. Chicken pox, for instance, develops for no apparent reason. We read in poultry books that this disease is caused by dirty surroundings, but the writer has known it to decimate a flock of fowls that were kept under ideal conditions. Enteritis too is unknown in England.

Then there is the most important question of rearing and feeding young stock. Can this be done on paddy alone?

By the time this is in members' hands, the Show will have taken place and we hope will have been successful. Owing to the Hatton Show the Club's finances are rather low, and many members have not paid their current year's subscription, but it is hoped they will do so at once.

The specials given at this Show are all for country-bred and there should be something really good penned by one well-known breeder and exhibitor of Black Orpingtons.

September is not a good month for a Show, as most imported fowls are in the moult, but it is hoped that all members will support this Show, and send in entries. Many new names were amongst those who exhibited at Hatton and we expect to see them again in Colombo.

The general meeting takes place on the same date and there are several important matters to be brought up. It is hoped that all those, who possibly can, will attend.

It will interest all to know that Mr. Dias' well-known Game Cock, "Rajah," taken to England by Mr. C. W. Jones, travelled very well. He has not been shown yet as the change of climate put him into the moult, but competent judges who have seen him state he is not pure-bred Malay Game but has too much Indian Game in him.

As soon as he was fairly over the moult he was to be shown, and news should come shortly as to whether he has done anything.

It would be of general interest to members if those who breed poultry in Ceylon would write to the Hon. Secretary their views on that common disfigurement "crooked breastbone." The writer has a brood of youngsters, all 7 months old, every one of which has this defect. They were never allowed a perch until 5 months old and have been well fed. Their parents had this defect and is there any case known of this being hereditary? Perhaps Mr. Sturgess could enlighten us.

Mr. Preston Plumridge seems to possess the good fortune of not "being done in the eye" by those from whom he imports his Black Orpingtons. The writer went to see his latest importation, a cock and a cockerel, and without hesitation he considers them the best specimens of this breed that have ever come to Ceylon. They are lovely deep, lowset, full-breasted birds and very typical. It will be interesting to see which is picked out by the judges at the forthcoming Show, alongside the cock that won everything at Hatton.

Mr. Plumridge's country-bred pullets and cockerels bred from his pen, exhibited in February, are a very good even lot; the pullets if anything looking better than the cockerels, as the latter are rather too young to judge. The growth on these birds is nearly as good as in English Orpingtons and it is not often one sees such a splendid lot of country-bred poultry. There is no breed that catches the eye more than the Orpington, especially the Black, and Mr. Plumridge is to be congratulated on his stock.

He should continue to add to his collection of "replicas!"

AGRICULTURAL EDUCATION

By C. F. BAKER.

(*Continued from p. 227*)

To underlie all this practical and most essential actual operation and field investigation, and to render it all *even possible*, there must be a preparation so broad and well founded as to insure thorough capacity, clear understanding, and masterly efficiency. The curriculum must, without fail, include work so broad and thorough in botany—the technical study of plants, their growth phenomena, their complex metabolic operations, and their intricate relations to the soil and surrounding conditions—that the student will be able always to work intelligently and think clearly in all matters affecting them. This, with the help of chemistry and physics, forms the scientific basis for modern agriculture. Well equipped and well manned laboratories for these lines of work are among the first things of all to be thought of in the real agricultural college organization.

All the modern methods in agriculture necessary to most economically and efficiently produce the maximum crops, may be unavailing, when injurious insects or parasitic fungous diseases attack the plants. The annual losses from these causes alone throughout the world, run into the hundreds of millions, frequently completely destroying the industries of whole regions.—Practical work along these lines is agricultural insurance of a most effective and necessary order. Students in the agricultural college should be given thorough training in Plant pathology and Economic Entomology, which shall effectively arm them for the work of the future, and these lines require special laboratories and equipment, and specially trained teachers.

Steering between inefficiency on the one hand, and extreme narrowness of intensive training on the other, the agricultural college must make itself also, in so far as it can, a school for citizenship. Its graduates are more than likely to become influential men among the masses, and they must be prepared for their responsibilities. Courses in Agricultural Economics and Finances, as well as general lectures on agricultural policy, agricultural co-operation, international agricultural dependencies, relation of the state and the community to agricultural development and similar broad treatments of agriculture in its various human phases, should certainly be given by the most competent public men, where possible.

The question of ample personnel and labour in the agricultural college, is always an acute concern. The college farm cannot be operated by students alone without seriously interfering with their studies, to say nothing of the many difficulties arising from the inevitable irregularity of their hours. An adequate labour force is a prime necessity. Cultures on the farm intended to do well, *should do better* than those on any surrounding native farm or,

discredit and distrust will infect both students and community. This will offset the many negative results that are necessary in all experimental work. As a great public institution representing the highest development of agriculture, the general upkeep of the place throughout should be a *model of thrift, care, neatness, and even beauty.* Lack of proper provision for labour is costly economy, and a fatal oversight

A COLLEGE OF TROPICAL AGRICULTURE.

It may be taken for granted that everyone is agreed that the time has come when an institution in which instruction in Tropical Agriculture may be obtained must be established. It may also be taken for granted that if it is decided that only one such institution shall be provided, the choice of a locality will lie between Trinidad, British West Indies, and Ceylon. Between the facilities which these two places respectively offer, I shall not attempt to judge—each one having facilities which the other has not—but, as one who has spent some time in both places, I should unhesitatingly give judgment in favour of Peradeniya, as possessing the climate the more conducive to study.

There is still difference of opinion, however, as to the form the institution should take. The London "Times" and "Nature" have spoken of a University. In the view of the present writer a University is at the present time out of the question ; as the Committee appointed by the Ceylon Board of Agriculture points out a University invariably comprises several other faculties besides that of Agriculture.

Probably, however, the writers in the "Times" and "Nature" meant to suggest that the institution should be of University rank, meaning thereby that it should not confine its work to the mere retailing of information, but should, through its faculty and students, be a centre of investigation, where essays would be made into the realm of the unknown in Tropical Agriculture.

And it seems to the writer that, unless we are to keep this ideal in front of us, as the goal towards which we are striving, there is little to be gained by establishing an institution at all. The scientific institution that is not permeated by the spirit of investigation has no standing in these days. "When there is no vision the people perish." But it is obvious that such an ideal could not be realised immediately, nor, indeed, for some considerable time. Research can be carried on only when the knowledge of what has been already accomplished has been acquired, and it would be in gaining a knowledge of this and of what still remains to be discovered, that the time of the student would be taken up for several years.

Of course the members of the staff might conduct research, and they ought certainly to be chosen primarily for their power of conducting research, for, if the ideal we have set before ourselves should be realised, the time will come when they will be called on to supervise the work of students engaged in research.

There is a tendency in some quarters at the present time to separate the functions of teaching and conducting research, but I think this is a tendency to be regretted. The only teacher who is a living force is he who is himself exploring the unknown.

The tendency has arisen because research requires concentration, and concentration cannot be obtained if the investigator has to leave his work at frequent intervals to teach. If the two functions are to be combined the teacher must be allowed generous leisure for his investigations.

This necessitates a large staff, but the days are past when the functions of teacher of Botany, of Zoology and of Geology may be combined in the one person.

We need not be afraid of any danger ot duplicating research and scientific work for a very long time to come.

Our institution would, then, for the first years of its existence be engaged chiefly in the teaching of the recognised methods of procedure in vogue in Tropical Agriculture.

But there would be no attempt to load the student up with facts, as if the science of Tropical Agriculture were a sealed book, and all one had to do in future years was to turn to page so-and-so of his lecture note-book. The teaching would seek to create a correct attitude of mind, to give power with knowledge, so that, when the student left to take up his life-work, it would be in the spirit of an investigator.

As L. H. Bailey, Dean of Cornell College of Agriculture and one of the foremost authorities on Agricultural Education in the United States, has said :—" The first responsibility of a College of Agriculture is to give a good educational course ; it deals with education rather than with agriculture," referring, as we take it, to the mental discipline we have spoken of above.

The institution must not alienate the student from manual labour, he must have practice in the ordinary mechanical operations of planting, for he only is able to direct others who can take the tool into his own hand and shew how it should be used.

At the end of the course the majority of the students will go forth, some to take up farming or planting on their own account, others, as teachers, to carry the knowledge they have obtained to those not able or qualified to attend college, but all as missionaries of scientific agriculture. Some of the abler students may choose to remain, and should be encouraged to remain, as research students ; it seems to the writer that only thus will our institution justify its existence. That there are no problems in Tropical Agriculture awaiting solution no one will seek to maintain, and where better, indeed where else at all, can they be undertaken than in such an institution as ours with its Experiment Station close at hand, and by whom better than our ablest students under the guidance of trained experimenters ?

It is this system that has made Agricultural Education in the United States what it is. The students of the American Universities are of two classes, the undergraduates and the graduates. The undergraduates are engaged for four years in the ordinary courses. At the end of a successful completion of their career they are awarded the Bachelor's degree. During that time they have acquired knowledge and power. There is a minimum of lecture work and a maximum of individual practical work in field and laboratory.

I speak of the agricultural student but the same system pervades all the faculties.

Many of them will then go out into the world. As E. Davenport of the Agricultural College of the University of Illinois, recently said:—"In a few days' time this University will graduate nearly a hundred men from a four years' scientific course in agriculture.....By the ratio of the past, 55 per cent. will go at once to their farms." But all will not go. Many will enter the Graduate School. Two higher degrees are open to them, the Master's and the Doctor's. For each of these a thesis embodying the results of a piece of original work is required.

In the Session of 1909-10 out of 968 students in Cornell College of Agriculture, 58 were Graduate Students. These men and women were all investigators.

In 1910 Cornell granted 35 Doctorates, 27 of which were in Science. At "Commencement" this year Cornell granted eight Doctorates in Agriculture. The titles of a few of (the theses) are:—"A Bacterial Disease of the stone fruits due to Bacterium pruni E.F.S.;" "The relation of ripe and unripe fruits and seeds to air;" "Fire Blight Disease in Nursery Stock;" all being concerned with problems in which New York State is agriculturally interested. There is a co-operation, too, between business firms and the College. A firm will give a scholarship on condition that the holder undertake research in a subject that they suggest. This work, of course, is accepted towards his degree.

The writer has had experience of Universities and Colleges at home as well as in the United States. To him the difference in the attitudes of the American and British graduates is very striking. The essence of the difference may be expressed by saying that, whereas, as the result of his university career, the American has acquired power "the British" has not.

The former is eager and able to tackle a problem and it is from his ranks that the various American Scientific Bureaus are staffed. The Britisher has a larger store of facts at his command, but the facts have got the better of him. He feels powerless to do anything. He has been too much lectured at and has consequently come to think that all knowledge is a closed book, that "the count of mighty investigators is made up and the bright scroll is in Ceres' hand" to amend Keats to our purpose.

There are faults in American Education, but that it turns out investigators everyone will, I think, admit.

South Africa has found out the superiority of the American system of Agricultural Education, and it was a surprise to the writer to meet young South Africans, holding Government Scholarships in agriculture, pursuing their studies in American Universities.

Who are to be our students?

I should say everyone who is desirous of becoming such, provided he is in earnest and has the necessary educational qualifications.

A high fee is no guarantee that we shall thereby exclude that pest of all colleges, agricultural and otherwise, the man who comes to have 'a good tim

For this reason I consider that it will be absolutely necessary that a reasonably high standard of educational qualifications should be demanded of our prospective students and that their continuance in the college should be dependent on satisfactory progress reports.

At first it may not be desirable to insist on as high a preliminary standard of education having been reached, as we might desire, but it will always be an easy matter to raise the standard, as facilities for education become more general. The point is that the college should not be thrown open to anyone whose parents are prepared to pay the fee.

Insistence on a certain standard of preliminary education has the further advantage that it would secure greater uniformity in the accomplishments of our students—a very important matter from the point of view of the teacher.

To secure this end PROF. BAKER, in a recent number of this Journal, has suggested that a preparatory school should be incorporated with a College of Agriculture in the Tropics, where High Schools are still few and far between.

In the United States it is the general rule that instruction in an Agricultural College is free to those residing within the State in which the college is situated. The prospective student, however, must have reached a certain preliminary standard of education, and this condition is rigorously enforced, so that one does not meet with the same element of slackness that is too frequently met with in similar institutions at home.

There is an air of earnestness pervading the class rooms and halls.

The pressure is kept up all the way through, and if a student shews by his record that he is not able or not willing to profit by the instruction, he is at once "sent down."

They are no nurseries', these American Colleges!

With so much of its wealth and welfare dependent on agricultural pursuits the Ceylon Government might very well make instruction in its Agricultural College free to Ceylonese. Short of this, they ought to provide the necessary scholarships that would enable the gifted boy to get the best instruction in agriculture that could be given him. Their bread, cast upon the waters, would not return unto them void!

With a college founded on wise and liberal lines we might very justly hope to attract men from other parts of the Empire, and even from foreign countries. These men, of course, would be required to pay fees and to satisfy the entrance requirements. Such men are very certain to come from Great Britain. In the general case they will be men who have taken a course of Agriculture in an institution at home, and who desire to specialise in Tropical Agriculture.

And here arises a matter for decision!

It has been suggested that, to give our college a standing, it should become affiliated to one of the home universities—to Cambridge or Oxford, I think it has been suggested.

I do not think that this is desirable.

And for this reason, there are those who will wish to come from other universities than Cambridge or Oxford. They will wish to come from London, Bristol, Manchester, Edinburgh and Aberdeen—to mention but a few—and I think they will come the more readily if here we have an institution that is independent of any particular University at home.

A. RUTHERFORD.

APICULTURE.

BEE KEEPING.

The Editor, "Tropical Agriculturist," Peradeniya.

Dear Sir,

The article headed "Apiculture as an Occupation for Women" reproduced in your Magazine (*Tropical Agriculturist*) from "The Gleanings in Bee Culture" is most interesting and instructive. It sets forth an easy method of colonising a hive thus:— "If they (bees) cluster on a bush, cut the branch and lay it before the hive, preferably on a large sheet of cheap muslin. Then tap lightly with a stick and you will soon experience a thrill of enthusiasm. The bees will march into the hive in regular order."

I remember to have read something similar to this either in a previous number of the "Gleanings" or the "Australian Bee-keeper" and tried this novel method over a dozen times but without success: but I did not make use of the large sheet of cheap muslin. Can any local bee-keepers explain the cause of my failure? Is it due to the non-use of the muslin sheet or to the fact that our bees are not sufficiently educated?

I have pleasure in informing you that there is now one Sinhalese lady bee-keeper amongst us, who is very enthusiastic and is never tired of studying the various aspects of bee-life, and that in spite of being stung several times at the start. She has now become so expert that she is able to handle a swarm of bees without fear of being stung.

I have taught a few of my neighbours and two of my servants to handle bees according to modern methods, but the absence of any literature on the subject places them at a disadvantage. I am about to help them over this difficulty, by publishing a work on bee-keeping in the Sinhalese language. The book is already in the hands of the printers.

Nature is very bountiful in her gifts to man, but man is slow in taking advantage of his opportunities. Though it has been proved that bees can be reared in Ceylon as successfully as poultry or other live stock, apiculture is extraordinarily slow in its progress. This is surprising considering the facilities provided us by the efforts of the energetic Secretary of the Ceylon Agricultural Society in securing a comb-foundation machine and an honey-extracting machine. Our climate is well adapted to bee-keeping and with the vast tracts of natural bee-pasture lying waste in the rural districts, there is good prospect of establishing a home industry which one would have expected to be taken up even for the pleasure of it.

Yours truly,

A. P. GOONETILLEKE.

Fancy Field Veyangoda, 5 October, 1913.

(We hope our correspondent will repeat his experiment in inserting swarm into the hive with the aid of the muslin sheet.

We recently saw some excellent comb honey taken from the hives in the Government Stock Garden where we understand the bees are very tractable and have taken to storing honey in supers. Those who were present at the All-Ceylon Exhibition last year will recall the excellent exhibits of Messrs. A. P. Goonetilleke and J. P. Obeyesekere.

The acquisition of a lady bee-keeper to the ranks of local amateurs is a matter for congratulation. The West Indian Bulletin Vol. I, p. 307 refers to a successful lady apiarist in Vere, Claremont, Clarendon Parish, who produced in a season over 10,000 lb. of extracted honey after she had been in the bee business a little over 18 months.

[That the Secretary of the Agricultural Society is, in response to requests, issuing a leaflet on the subject of bee-keeping: but Mr. Goonetilleke's book in the Venacular should give a great impetus to the industry in Ceylon.—Editor, Tropical Agriculturist.

BEES IN BAVARIA

The organization of beekeepers of Markt Oberdorf and the surrounding country arranged for a short course of instruction in beekeeping free, not only to the members of the organization, but to outsiders also. Mr. C. Hofmann, Munich, in charge of apiculture in Bavaria, conducted the course. Being so late in the season, practical work in the apiary had to be omitted. First was given a talk on the history of beekeeping in general, and especially in Bavaria.

IMPORTANCE OF BEEKEEPING.

The value of colonies, wax, and honey, based on the number of colonies in 1907, was estimated at two and a half million of dollars—quite a sum for so small a country. For this reason the government encourages and fosters beekeeping in every way. The service bees render to agriculture by fertilizing the flora is great. Some one has ventured to estimate the value per colony at $20.00. He thought, probably, he would rather lose the game by playing a card too many, as Sancho Panza said. The flowers secrete nectar so the bees and other insects will visit them and bring and carry away the needed pollen. The nectar is usually within, at the base of the flower; and while the bee or other insect endeavours to get to the sweet, the pollen sticks to the hairy garment of the bee; and when she touches the pistil of the flower a few of the fine grains of pollen do the work. The "Wiesen Salbei," a salvia, has a peculiar construction. In order to get to the nectar the bee has to push the short end of a lever. On the long end is the stamen. The bee pushes the button and does the rest. We see how wise it is that the bee, while gathering nectar or pollen, visits but one variety of flower or blossoms; otherwise the probability of bringing the needed pollen to the right place would be greatly lessened.

ANATOMY.

The *chitin skelet*, as well as the interior organs, were thoroughly discussed. Drawings on the black board, charts and a model, helped to elucidate the subject. The anatomy and physiology of the bee is very interesting and complicated. The antennæ alone have many thousands of organs of sense.

The tongue is part of a complicated suction apparatus. The legs show a marvellous adaptability for walking on the ceiling or on glass. They can hold a great weight, as is shown when bees collect pollen in the basket to carry it home to the babies. The stinging apparatus is wonderfully made. The novice will readily conceive that it is fearfully made.

VARIOUS RACES COMPARED.

Of the many varieties of bees, the Italian, Carniolan and the common black bee were mentioned, and the character of each described. The Italian begins too early to rear brood. We have here much bad weather in spring, even in late spring. The extensive brood-nest entices the bees to untimely errands for water and pollen ; and many, owing to inclemency of the weather, will not be able to return ; consequently much energy is wasted, and the colonies at the beginning of the honey-flow are not as populous as they ought to be and the result is a deficiency of the surplus. It is also alleged that the Italians do not winter well. I have not been able to test these claims. I have imported several queens at different times from the United States, but the queens seem to have suffered so much by the long confinement and the hardships of the voyage that they were not qualified for any thing. However, I think the descendants might be all right. Only one queen survived the winter. The trial would have to be made by testing from four to six at one time, and early enough in the season to raise some queens to replace those which seem unable to pass the winter.

The Carniolans stand the winter very well ; are very gentle and industrious ; but owing to their swarming propensity they often fail to give surplus when the common black bees do. This is particularly noticeable in poor seasons. The common black bees seem best adapted to this climate. They moderate or stop brood-rearing very promptly according to weather and season. They make their surplus more by judicious economy than zeal in gathering—at least it seems that the Carniolan is just as industrious. So far as I know, there is not one Italian colony for many miles around here—say not one in ten thousand. In other parts of Bavaria or Germany there are some, but not many. Here we have blacks and Carniolans, mostly mixed breed of the two. The principal disadvantage of the mixed breed, I think, is that they do not transmit their good qualities to their progeny as well as pure-bred varieties. Of course this law of heredity is as true of the higher animals, if not more so.

In this report I have given an outline of the topics that were treated more or less fully by the instructor.

The metamorphosis from the egg to the grown insect was illustrated, and to the practical bearings special attention was called under the head of "How bees should be handled ; the stinging of bees, and protection against it ; convenient way to feed bees, and when to feed ; preparation of hive and comb for moving ; the various hives and frames in common use ; bee-houses (bees are kept here in bee-houses, just as the reverse is true in the United States) ; utensils and apparatus were shown and explained ; combs and frames (the wiring of frames was shown) ; how to manage the bees at different seasons in order to obtain the best possible results ; the selection of colonies for breeding ; queen-rearing ; disease of bees, especially of foul brood ; and last, the enemies of bees."—J. A. Heberle in Gleanings in Bee Culture.

GENERAL.

CEYLON AGRICULTURAL SOCIETY.

(Annual meeting held on August 12th, 1913, at Queen's House, Colombo.)

The annual general meeting of the Ceylon Agricultural Society for the year 1912-13 was held at the Council Chamber at the Queen's House, Colombo, on Tuesday the 12th August, 1913, at 12 noon, HIS EXCELLENCY the OFFICER ADMINISTERING THE GOVERNMENT presiding.

There were present :— The Hon'ble SIR S. C. OBEYESEKERE, SIR SOLOMON DIAS BANDARANAIKE, the Hon'ble MR. A. S. PAGDEN, the Hon'ble MR. A J. R. DE SOYSA, the Hon'ble MR. H. VAN CUYLENBURG, DR. H. M. FERNANDO, MESSRS. A. N. GALBRAITH, F. M. MACKWOOD R. N. LYNE, J. HARWARD, A. S. LONG-PRICE, JAMES PEIRIS, A. RUTHERFORD N. J. MARTIN, A. W. BEVEN, C. E. A. COREA, H. L. DE MEL, D. S. CORLETT, A. W. WINTER, F. J. S. TURNER, H. F. MACMILLAN, J. G. TENNEKON, W. A. DE SILVA, G. W. STURGESS, F. L DANIEL, A. BRUCE, H. AMARASURIYA, A. DOHME, C. V. WICKRAMANAYAKE, L. E. CAMPBELL, L. W. A. DE SOYSA, W. M. RAJAPAKSE, J. V. WEERASINGHE, DAN JOSEPH, JOHN FERNANDO, E. MONTAGUE COOKE, TUDOR RAJAPAKSE MUDALIYAR, MEEDENIYA DISSAVA, REV. A. G. FRASER, K. B. BEDDEWELA, MUDALIYARS A. E. RAJAPAKSE, J. V. ATTAPTTU and S. WEERACKKODY, and C. DRIEBERG (SECRETARY) and several others.

Minutes of the previous meeting held on July 3rd, 1912, were read and confirmed.

Annual Statement of Accounts for the year 1912 was duly adopted, on the motion of MR. W. A. DE SILVA seconded by MR. TUDOR RAJAPAKSE.

The Secretary's Report for the year was accepted on the motion of SIR SOLOMON DIAS BANDARANAIKE seconded by MR. FRANCIS DANIEL.

A list of members of the Board as reconstituted was read.

MR. LYNE moved :—" That an unofficial member failing to attend three meetings in succession *ipso facto* vacates his seat, unless such failure is due to temporary absence from the Island, or to illness." MR. JAMES PEIRIS seconded and the resolution was carried.

The Report of the sub-Committee on the proposed amalgamation of the Poultry Club with the Agricultural Society was read by the Secretary. On the motion of MR. H. L. DE MEL, seconded by MR. G. W. STURGESS, the Report was adopted.

The Secretary read a brief note on the introduction of the Indian lac insect into Ceylon and exhibited specimens of lac produced locally.

The paper on the proposed College of Tropical Agriculture by the Director of Agriculture, previously circulated, was next discussed.

MR. LYNE then addressed the meeting with reference to his proposals explaining that they were only tentative and mainly intended to elicit the views of members.

HIS EXCELLENCY the PRESIDENT moved and MR. F. M. MACKWOOD seconded (DR. H. M. FERNANDO, the REV. A. G. FRASER, the Hon'ble MR. H. VAN CUYLENBURG, MR. HARWARD, MR. F. J. S. TURNER and MR. DE MEL supporting):—"That the Board approve of the general lines of the Scheme put forward by the Director of Agriculture and that copies of the Scheme be sent to members of the London Committee." The Hon'ble MR. MOONAMALLE, who was prevented from being present, telegraphed his hearty support of the scheme as outlined by the Director.

H. E., THE PRESIDENT announced that the Hon'ble MR. DE SOYSA had given a start to a local fund for the building and endowment of the College by a Donation of Rs. 2,500. They all appreciated the practical nature of the support given by MR. DE SOYSA which others in the Island would no doubt emulate.

A vote of thanks (proposed by the Hon'ble MR. PAGDEN and seconded by MR. DANIEL JOSEPH) was accorded to the Director of Agriculture for the interest he had taken in advocating the claims of Ceylon in connection with the proposed College.

C. DRIEBERG, Secretary.

MINNERI TANK.

(*Illustrated.*)

This beautiful tank, the subject of our illustration, situated about 15 miles from Habarana on the road to Polonnaruwa, was constructed by KING MAHA SEN, A. D. 275. It has a circumference of over 20 miles and, fully restored, should be capable of irrigating 200,000 acres of land. TENNANT referring to it says :—"The whole scene, the hills, the hanging woods and the glassy waters seem to my mind like visions of Killarney warmed and illuminated by an Eastern Sun."

Such tanks as this and Kalawewe (over 40 miles in circumference) give one an idea of the skill and energy that characterised the engineers of a remote period. The command of labour must have been extraordinary, particularly when it is considered how imperfect must have been the tools and implements of that day: while the population for whose use these gigantic reservoirs were intended must have been enormous. Their construction would have been impossible but for the existence of a system of compulsory labour which the king had a right to employ for public purposes.

The importance of the tank irrigation system in the dry areas in which it exists cannot be overestimated, and the gradual return of population to these depleted areas (which is bound to take place in course of time) should result in the Island once more supporting its inhabitants on home-grown grain with a substantial surplus for export.

At present Agriculture in the Tamankaduwa district, in which Minneri tank is situated, is in a very backward condition. The Sinhalese population enfeebled by a unhealthy climate and a poor diet are capable of little effort and the cultivation of the land is chiefly in the hands of Moors. The district

[*Photo. by C. Drieberg*]

MINNERI TANK.

One of the great irrigation Tanks of Ceylon.

is, however, fortunate in having a sympathetic and progressive chief in the present Revenue Officer, and the recent visit of the Director of Agriculture and the Secretary of the Ceylon Agricultural Society with a view to extending the benefits of the Co-operative Credit Movements will, it is hoped, bear fruit.

C. D.

CULTIVATION OF THE GRAPE WINE.

By A. M. SAWYER.

Of all fruit-plants, the Vine alone is the surest to produce a crop each year. It begins to yield in the second or third year from planting and, thereafter and up to the limit of its capacity, bears annually in increasing quantity. With ordinary care it lives for many years,—often, even for more than a life-time,—and it is in the experience of its cultivators that while the vine is one of the most paying of crops it is also among the more easily cultivated.

CLIMATE.

Although the vine has been grown for centuries in some of the most inclement climates of the world and may be cultivated even with a good deal of profit over a very wide range of temperature, it detests stagnation in the air or soil and shows a great preference for a warm, dry climate. It is a plant with a distinct period of growth and a distinct period of rest and though, throughout the growing period, it demands considerable moisture at the roots and will stand a moderate amount of rain, heavy rainfall is ruinous to its growth and is particularly disastrous to the fruit if it fall when the latter is swelling to ripen.

SITUATION.

The vine revels in a warm situation and thrives only when it is fully exposed to heat, light and free currents of air. In the low country, dry situations on the banks of rivers and streams and the margins of *Ins* or fresh water lakes and, in the hills, high land with a sunny southern exposure or sloping land about rivers and lakes with southern or even northern exposures are likely to suit the requirements of its cultivation.

SOIL.

It is not fastidious in regard to soil, being easy to grow and doing well on almost any average garden soil which is deep, drained and well cultivated. Open, porous, clayey or gravelly loams or alluvial loams with a good proportion of clay are suited for its cultivation, though the best vine-soils are deep free loams which are well drained and contain an abundance of lime. Lime in the soil is very essential for its best growth and highest production. The worst soils are cold water-logged clays, peat, and sand without consistence.

CULTIVATION.

Methods of Propagation. The vine may be grown from seed, cuttings, layers or grafts. Propagation by seed is seldom practised because, like most fruit-plants, the vine is unknown to "come true to seed," the off-spring, as a rule, revealing features which are distinct from those of the parent-plant and

usually more or less deterioration. Grafting is useful for the perpetuation of new, rare or valuable varieties, for strengthening weak vines, renewing old ones, and rendering delicate varieties immune to disease. The more usual means of propagation are cuttings and layers.

Cuttings are sections of the cane (young branch) made during the period of rest—when the leaves have dropped and the buds are dormant (not swelled or growing). Well-matured wood of the present season's growth, which usually furnishes the best cuttings, should be taken from vines in perfect health and in good bearing condition. Good yielders among local varieties, if available, are generally the best to select from; while, the introduction of foreign varieties will usually need much time for acclimatization and be largely experimental. A cutting may consist of a single joint with an inch or two of the cane on each side of it or it may have two or even three joints. A cutting with two joints is generally the best. In such a cutting, the cut at the lower end is made just below the joint and that at the upper an inch or two above the joint. A sharp thin-edged knife should be used and the cuts be made perfectly clean. The cuttings may be set two to four inches apart, each at an angle of about thirty degrees, in loose, rich, well-prepared soil, thrown into beds or shallow trenches. The rows of cuttings may be three to four feet apart. The resultant plants which should be watered by hand or irrigation-channels so as to keep the soil moist but not drenched, will be ready for planting out on the field by the end of the year in which they are sprouted or in the early part of the ensuing year. Propagation by cuttings is the simplest and most common of the methods in vogue with the vine but it is less certain in its results than the somewhat more difficult method of layering; for, even with the greatest of care and attention, some at least of the cuttings are likely to fail. It is therefore not only safe but necessary that at least three times as many cuttings should be set as the number of plants which will be ultimately required for the complete stocking of the area to be planted and for the repairing of blanks caused by failures on the field.

Planting.—The young vines may be one or two years old at the time of planting them out. Usually, however, strong one-year-old plants with abundance of roots are preferred for planting. The following points need attention in the actual planting itself:—

(a) The pits should be at least 3 feet by 3 feet by 3 feet and completely filled in with the finest soil free from stones, wood and rubbish. They should be made at distances of 8 to 10 feet apart both in the lines and between them, so that an acre will hold from 680 to 435 plants.

(b) Each plant, whatever its size, should have its canes cut down each to 2 or 3 eyes (buds) from the base and its roots shortened to about a foot in length.

(c) The soil should be carefully worked about the roots, which should be spread out and placed at least 6 inches below the surface, and thoroughly well firmed down with the feet.

(d) In severe locations and gravelly soils, to prevent root-killing, the roots should be set at least 12 inches deeper in the pits than the depth at which they stood in the nursery beds.

(e) The plants should be watered by hand or by irrigation, lightly at first, but more freely on striking root.

CARE OF THE FRUIT.

If the fruit sets well, the clusters should be thinned by removing the smaller fruits so as to give more room for the development of the larger ones. This is done by clipping them off carefully with a pair of fine scissors. The fruits, as they approach ripeness, should be protected by soft cloth bags against birds, insects, fungi, frost and dust. They should not be cut before they are fully ripe, for the grape does not ripen after it is picked. In young vines, especially those of weakly growth, the number of bearing canes should be curtailed and the fruits themselves freely thinned.

From 10 to 15 pounds of marketable grapes is a fair average yield for a vine and, though 7,000 pounds per acre is a good yield, heavier crops may be often obtained.—DEPARTMENT OF AGRICULTURE, BURMA. (BULLETIN NO. 9.)

EXPLOSIVES AND TEA CULTIVATION.

The use of explosives in tea cultivation is in the experimental stage, but the experiments have been sufficiently successful to prove that it is well worth while to continue the investigation. The subject is dealt with in a very interesting paper published in the QUARTERLY JOURNAL of the Scientific Department of the Indian Tea Association. Experiments were begun in the early part of 1912 at the Assam Company's Mazengah garden, under the management of Mr. MUCKLOW; and since then trials have been made in other parts of Assam, in Cachar, Sylhet, and the Dooars. The value of explosives in loosening and breaking up hard soils has, in fact, been tried on a fairly large scale in the tea districts of North-East India. From the nature of the experiments it was not considered probable that any very marked result would be noticeable during the first year following the explosions. Some information is given, however, as to the outcome of the pioneer experiment at Mazengah garden in which dynamite was used. The results are said to be favourable. Drainage has been improved owing to the breaking up of the "hard-pan" stratum of the soil. Tea re-planted, in abandoned land, after dynamiting, is stated to be better than on similar land not so treated. A plant close to a shot hole is said to be much better grown than one further away. It might be conjectured that this is due to an actual improvement of the soil, for in the course of the paper a statement is noted that cultivation by explosives promotes the development of suitable bacterial flora in the soil thereby promoting its fertility. In dealing with the use of explosives in tea cultivation, or in other forms of agriculture, there are many points requiring very careful consideration, and one of the first is the right kind of explosive to employ, having regard to climatic conditions and the nature of the work to be done. This matter is discussed in the paper, and a brief outline is given of various types of explosives that may prove useful for agricultural purposes. No single explosive is named, however, as being suitable for all climates and conditions. Incidentally, the writer takes occasion to expose the fallacy of the general belief that dynamite strikes downwards. This idea would seem to have arisen because dynamite

when exploded unconfined on the surface of the ground, makes a hole or crater, whilst gunpowder makes no such hole. The explanation, however, is not that dynamite strikes downwards rather than upwards, but that there is a difference in the violence of the two explosives. Gunpowder, being comparatively slow in its explosion, expends its energy along the lines of least resistance, in the air, whereas the more violent dynamite exerts its force in all directions at the same time. When exploded below the surface of the ground, both dynamite and gunpowder produce craters. Amongst other points noted by the writer is the well-known fact that nitro-glycerine compounds are more dangerous in storage than is gunpowder, as they are liable to spontaneous combustion from being exposed for a long time to an elevated temperature, which sets up a chemical decomposition. This process further elevates the temperature until sufficient heat is developed to explode the material. An explosion of two magazines, undoubtedly due to spontaneous ignition, occurred at Aden during the hot weather of 1888, and this, it is stated, affords evidence that the atmospheric temperature in the tropics is, in certain conditions, sufficient to bring about decomposition of nitro-glycerine compounds which may result in an explosion. Another danger in the case of a liquid constituent of an explosive is that of leakage, which with nitro-glycerine explosives has been the cause of many accidents. The chief value of explosives in tea culture, according to the writer in the Quarterly Journal, will doubtless be found in the possibility of deep cultivation, that is to say, cultivation of the subsoil at a depth of three feet or more, such as could never be obtained by trenching or deep hoeing. The soil, when shaken or split up, can be more readily drained. "Hard-pan" can be effectually destroyed. Explosives can do instantaneously the work of breaking up hard sub-soils for which the slow process of growing deep-rooted trees has been employed. Old tree-stumps, with their risks of root diseases, can be readily extirpated. Drainage and trenching can also be carried out by the use of explosives. There is much yet to be learned in the practical employment of this new agency. The experiments carried out by the Scientific Department of the Indian Tea Association on the Tocklai garden of the Jorhat Company, and other trials made at Sathgao, on the Tilkah Tea Estate, and at the Panitola garden of the Jokai Company, have helped to advance the knowledge of the subject so far acquired, and there seems good reason to hope that the outcome will be of substantial advantage to the tea industry.

TRIALS OF BROOM CORN.

In September, 1912, the Department of Agriculture received from the Bureau of Plant Industry, Washington, U. S. A., in response to a previous request, samples of three approved varieties of broom corn for trial, viz., Dwarf Standard, Dwarf, and Standard. It was stated that the Dwarf Standard had been reduced by selection to a dwarf stature, but still produced a standard brush.

Packets of the seed were sent for trial to the Hawkesbury Agricultural College and the Bathurst, Grafton, and Yanco Experiment Farms.

At the Hawkesbury Agricultural College, owing to the dry season, the crop proved an absolute failure. White Italian was grown as a check, and grew to a height of 3 feet, the Standard growing to a similar height, while Dwarf and Dwarf Standard reached 2½ feet. During growth, and when in head, the White Italian appeared slightly superior to the others.

At the Bathurst Experiment Farm the season was also decidedly unfavourable for this crop, and it was not possible to obtain any figures showing the comparative yields. The Dwarf and the Dwarf Standard were vigorous in growth, reaching a height of 3½ feet, but were later in ripening than ordinary broom millet, and the brushes were short and of inferior quality. The Standard grew to a height of 5½ feet, and gave some very fine plants of good quality. The yield was light, on the whole, and the seed of a paler colour than the White Italian. The last-named, which is the usual variety grown at Bathurst, proved the best all-round type. It grew to a height of 6 feet, yielded better than the others, and produced the best and largest brush.

At the Grafton Experiment Farm the Dwarf varieties germinated satisfactorily, but the Standard came up rather thinly. The number of days taken to reach the same stage of maturity was:—Standard, 99 days; Dwarf, 122 days; and Dwarf Standard, 130 days. One hundred feet of a row of each variety was examined at the same stage of ripeness, with the following result:—

Variety.	First-class Brushes.	Second-class Brushes.	Length of Brush.	Height of Stalk.
			inches.	ft. in.
Dwarf	131	131	11-8	3 11
Dwarf Standard	117	44	16-5	4 5
Standard	73	27	21-4	8 2½

This classification into firsts and seconds only refers to quality and not to length.

The results seem to be in favour of the Standard, which, besides being earlier than the other varieties, is nearer the trade requirements for the manufacture of brooms. The average length of brush permits of it being included in the "hurl" Class. The Dwarf varieties could only be classed as "insides." The Dwarf, in fact, is rather too short even for this, the lowest grade.

Although not tested side by side, it is very evident that none of these imported varieties are comparable with the best local varieties, although acclimatisation may result in raising the standard considerably.

At the Yanco Experiment Farm the seed was sown on 8th September, 1912, in rows 3 feet apart, with the Planet Junior seed-drill. During growth the crop was irrigated and cultivated whenever necessary until it had made full growth. Before the heads began to spread with the weight of the seed they were turned down in the usual manner. At maturity the Standard was 7 feet high, and the Dwarf and Dwarf Standard 4½ feet. At the end of March the heads were cut, brought into the shed, and cured.

The broom of the Dwarf and Dwarf Standard was much too short to be of any use except as the low-grade "insides" used in broom-making. The Standard produced a good long broom and appeared worthy of further trial. The broom of all three varieties was considerably discoloured by the attacks of aphis.

From the reports above quoted it is apparent that it is only advisable to continue the trial with only one of the varieties—viz., Standard—and arrangements have been made by the Acting Under-Secretary and Director of Agriculture with the Principal of the Hawkesbury Agricultural College and the managers of the Bathurst, Grafton, and Yanco Experiment Farms to plant seed of this side by side with seed of the local variety known as the White Italian, and also a variety recently obtained from Italy. The trial can hardly be taken as a fair test this year, as the Italian seed will not be acclimatised, but it will serve as a basis for further experiments later on.—AGRICULTURAL GAZETTE OF N.S.W.

MULCHING.

The more we see the effect of heavy mulching on light soils and in dry climates we realize the transformation that this process is effecting and can further effect in our agriculture. It enables good crops to be grown under such conditions of products usually grown only in districts of good rainfall and in strong land, and absolutely ensures crops from the plants accustomed to dry conditions, even in long drought.

But we are finding out something more and that is that those soils in seasonable districts, which would not grow bananas with the best of ordinary cultivation, such as the stiff red clays and "shotty" soils, will produce good bananas and enable cocoa to be established, by mulching in addition to good deep drainage (2 to 3 feet).

Mulching has another great economic advantage. Jamaica is a land of valleys and often of steep and rocky hillsides which, beyond growing wood, are not utilised. And large stretches of these have been made bare of trees and are useless.

Where districts are dry, and where the soils of the cultivable parts are poor, the land has been given over to stock, requiring a good many acres to support one head per annum.

In some localities owners are fortunate in having also Pimento and Logwood growing on such poor lands. Yet there are steep and rockly hillsides that are carrying no stock, but grow grass, weeds and bush. Even where cattle are grazed on steep and rocky hillsides not able to carry more than one cow per two or three acres a much better return, per acre, can be made by utilizing the grass and weeds and bush as mulch, as the good soil of the lower slopes and the valleys can be put under cultivation.

Every stock raiser in the island can thus cultivate some economic crops, even bananas, by mulching his land. So that steep and rocky hillsides, where there is no pimento and no logwood can now add their quota to the Island's wealth. They are available as producers of mulching material. And

it pays to carry this stuff—grass, weeds and bush—long distances, apply it even to the extent of £3 to £4 per acre, because the mulch ensures crops, prevents the growth of weeds and saves further turning over of the soil.

The application of a deep mulch saves at least two weedings at 6/- per acre and two forkings at 30/- per acre, as minimum £3 12*s*. involved in cultivating the heavy lands in the regular banana districts where there is a more or less heavy rainfall. In addition the mulch adds manure to the land and to some extent prevents wash on hillsides.

The difficulty in some places like St. Elizabeth is for small settlers with limited land to get enough mulch. The provision of material for mulching in such places can be made by not permitting a scrap of household waste, droppings of animals, or roadside weeds, grass and bush, or roadside scrapings to be lost. The grass and bush along our roadsides can provide large quantities of mulch.

A new era in Agriculture is approaching, we hope.—Jamaica Agricultural Society's Journal.

A DISCUSSION ON GREEN MANURING.

Green manuring is of two kinds. A non-leguminous crop may be grown and ploughed under when it has attained its most luxuriant growth, in which case naturally no addition is made to the store of plant food in the soil, the constituents taken out by the crop being returned. This method of green manuring is practised solely for the purpose of improving the "body" of the soil; in other words, of adding to its humus content. A fertile soil requires to be rich in humus, since this enhances its moisture-holding capacity, yet without incurring the risk of water-logging. The other method of green manuring is that of planting a leguminous crop—peas, beans, earthnuts, cowpeas, and so on—and ploughing it under in the same way as under the former system. The advantage of this practice is that, not only is humus added to the soil, but the nitrogen-content of the land is considerably increased.

We return now to our original consideration—the position presented by our correspondent. In this case, of course, there is no question of green manuring, as the earthnuts are required for market, and by the time they mature the plant itself is of little value from a humus point of view. Ploughed in, nevertheless, after the harvesting of the nuts, the dried plants would increase the store of nitrogen in the soil. Our correspondent, however, keeps pigs, but does not go in for dairying, and he is accordingly using the earthnut plants as forage to meet the nitrogenous requirements of pigs during the winter, and he will probably, therefore, find this a more economical method of utilizing the dry plants. Where he scores, however, is in the supply of nitrogen which the plants have left in the soil—nitrogen gathered from the atmosphere during the growth of the earthnuts, and stored up in the roots.

It is because of this addition of nitrogen to the soil that we recommend our correspondent, and other maize growers in suitable districts, to go in for earthnuts. Even a small acreage will be of material assistance, the idea of

course being to grow the crop on a fresh field each year, following it with maize during the seasons required for the covering of the other fields in succession.

This is a modified rotation which would materially help maize growers to secure better crops and stay the wearing out of the land. By ploughing in a green crop now and then the results would be even better ; but how frequently this can be done, of course, must depend upon local circumstances. —SOUTH AFRICAN AGRICULTURAL JOURNAL.

ROYAL BOTANIC GARDENS, PERADENIYA.

Visitors to the Royal Botanic Gardens, Peradeniya, for the months of July and August numbered 2,277 and 2,716 respectively.

RINFALL FOR AUGUST.

Place	1913	1912	Place	1913	1912
	in.	in.		in.	in.
Colombo	1·17	1·40	Kurunegala	1·69	2·61
Kandy	4·55	4·80	Batticaloa	2·02	0.77
Galle	4·64	5·06	Ratnapura	8·33	7.15
Jaffna	0·18	1·20	Badulla	0·10	2·52
Anuradhapura	0·21	1·32	Nuwara Eliya	8·47	7·67

DUTCH DAIRY METHODS.

The most minute precautions are used in the model dairy farms near the large centres in Holland in order to produce milk having the greatest degree of purity, it being designed specially for consumption as fresh milk. Even the kind of food given to the cows and its quality are looked after so as to avoid digestive troubles which are known to affect the quality of the milk. Before milking, the hind parts and udder are carefully washed with boiled water and boric acid, and then the animal is taken to the milking room, this space being washed and disinfected once a day. The milk is collected in special sterilized buckets. In these establishments the personnel undergoes a medical examination to insure their being quite healthy, and they are required to put on a special jacket before the milking, also to wash the hands in sterilized water. In this way the milk is assured to be as free from germs as it is possible to have it.—SCIENTIFIC AMERICAN.

CASTOR-OIL SEEDS IN MOZAMBIQUE.

The Castor-oil plant is found occupying all waste land adjoining native kraals, particularly in lands of low and medium elevation in this Territory where it grows practically in a wild state. The natives use the oil as an unguent and for anointing their hair, for which purpose they first mix it with iron ore finely pulverised ; they also use it medicinally. Five distinct varieties were collected last year in the Madanda district of Mossurise, and forwarded to the Imperial Institute, London, for examination and report. These varieties may be described as follows :—

1.—Small beans, brown mottled.

2.—Medium size beans, black mottled.

3.—Medium size beans, brown mottled.

4.—Large beans, light coloured and mottled.

5.—Large beans, long and black in colour.

No. 1 is the variety most commonly found, and No. 5 is comparatively rare.

The following report has been received on these samples from Professor W. R. DUNSTAN :—

"The samples were all in good condition, and found to give the following yields of oil— :

No. 1	...	41·9 per cent.
No. 2	...	47·0 ,, ,,
No. 3	...	43·5 ,, ,,
No. 4	...	49·5 ,, ,,
No. 5	...	47·1 ,, ,,

"The samples were all of satisfactory quality, and similar seed would be readily saleable in Europe. The prices realised would depend to some extent on the percentage of oil present, but would approximate to that of Bombay castor seed, the current value of which is £12 7*s.* 6*d.* per ton (May 1912). It will be seen that sample No. 4 gave the best yield of oil (49·5 per cent.) whilst Nos. 2 and 5 also gave very good yields (47·0 and 47·1 per cent.) The common variety No. 1 contained the lowest percentage of oil in the series.

"In selecting a variety of castor seed for cultivation, attention must of course be given not only to the percentage of oil in the seed, but also to the yield of seed per plant, and the suitability of the variety to the soil and climatic conditions in the area in which cultivation is to be undertaken. It is also advantageous in cultivating castor seed to select a variety which ripens all or nearly all of its fruits at one time, and the fruits of which open easily after collection."—AGRICULTURAL JOURNAL OF THE MOZAMBIQUE COMPANY.

FRUIT AND VEGETABLE CULTURE AT PERADENIYA EXPERIMENT STATION.

CITRUS.

The citrus trees have been slightly infected with "green bug," probably from the neighbouring coffee trees and also with the fungus (*Erysiphe*) and the common tea aphis (*Ceylonia theaecola*). Constant watching and spraying is required.

BANANAS.

These have come up very well and undoubtedly the plants look much stronger and healthier than those planted in the Sinhalese manner. But those suckers which were kept for ten days before planting took nearly three weeks to come up. Those planted two days after separating came up in ten days.

The river-bottom plot was completely under water on August 17th, leaving a fine deposit of silt, which should much benefit the plants.

VEGETABLES.

Of the vegetables all the seven beds of varieties of beans were destroyed by the bean-fly (*Agromyza phaseoli*) in a few days.

Kohl-rabi was attacked by a red ant (*Dorylus orientalis*) eating the roots. An application of "Vaporite" dug in, however, effectually stopped the further attacks of this pest.

The tomatoes are now making a fine show being trained up on bamboo trellis. At first a good many plants were attacked by the stem disease caused by *Bacillus solanacearum* but by promptly pulling up and burning any plants showing signs of drooping leaves and by spraying the rest with Bordeaux mixture, the disease was checked. Once the disease has made its appearance no species of *solanaceæ* should be replanted in that soil.

Beet-root and carrots are doing very well, as are all the native vegetables. Marrows, cucumbers and gourds, it is advisable to spray with Bordeaux mixture to prevent fungus on the leaves.

D. S. CORLETT.

DRY-FARMING AND TROPICAL AGRICULTURE.

DR. WIDSTOE, President of the Agricultural College of Utah, and well known as an authority on dry-farming, in acknowledging receipt of the April number of TROPICAL LIFE containing an article on his book "Are Dry-Farming Methods an Advantage in the Tropics?" wrote:—

"I believe you are perfectly right in your applications to tropical agriculture. Dry-farming, after all, is little more than good farming in which little things are well looked after. That method should be of value anywhere in the world."—*Tropical Life.*

WIND AND PLANT GROWTH.

Few think of wind as a factor of importance in the growth, health, and yield of plants, but extensive experiments recently conducted by Dr. Oscar Bernbeck of the Agricultural Academy of Bonn-Poppelsdorf, Germany, prove that wind pressure exerts a marked effect. Plants exposed to severe gales tend to take abnormal forms. They not only bend away from the wind, because of the pressure exerted on twigs and roots, but the sprouts on the side toward the wind are frequently broken or injured, and wounds cause a knotty growth. Moreover, the drying of the ground may occasion serious injury to the plant and lasting damage to the soil itself in both its physical and its chemical qualities. Dr. Bernbeck has published a report of his investigations where we read that "The water-loss of the ground at a wind velocity of 33 feet per second was shown to be three or four times as great as on protected land. Also, the mechanical effect of the wind on the sprouts was to diminish the energy of growth, by reason of the increase of transpiration, injuries, and alteration of the hydrostatic conditions in those tissues wherein there is a circulation of water.

"On some soils, experiments showed that the gain in growth varied in the ratio of three, two, and one, with wind velocities of zero, five, and ten, reckoned in metres per second. The lowering of the temperature of the plant and of the ground also enters into the question, and the degree of dampness of the ground affects the results and must therefore be considered a factor. When the ground was sufficiently damp, and the young sprouts were stiff and firmly bound, the wind was comparatively harmless.

"The figures quoted show clearly what great injury the national agriculture suffers in localities exposed to wind. A moderate wind velocity of 10 to 25 feet per second, such as is usual in Germany, may diminish the yield of exposed land by more than half.

"Remedies may be found in the use of artificial wind-shields, such as walls, hedges etc., and especially in the forestation of outlying heights, by means of which the current of wind is directed into higher strata of the air and broken."—Wealth of India.

QUALITY OF ROBUSTA COFFEE.

Considerable variation is to be found in the opinions expressed as to the quality of Robusta Coffee, but it is not improbable that such differences are in some measure to be explained as a result of different methods of preparation, not all of equal excellence. It is stated that the beans do not possess a first-class colour, and that for the first two crops a good aroma is lacking. Dr. Wildeman affirms that the flavour recalls that of Liberian coffee, but with less aroma. Hart compared Robusta coffee of Costa Rica and the East Indies; while, according to Cramer, the quality of well-prepared Robusta coffee is approximately that of middling Arabian coffee. The beans possess a bluish green colour, similar to that of the Arabian product, but they are of a somewhat different shape, being larger and more convex on the curved side.—Tropical Life.

NITROLIM IN THE CULTIVATION OF POTATOES.

Mr. A. W. Fremantle, Principal of the Agricultural College at Cawnpore, U. P., India, has been experimenting to test the advantages of nitrolim in the cultivation of potatoes. As a result of this we are now told that a plot of 1/20th of an acre was planted with potatoes after the application of nitrolim at the rate of 80 lb. per acre ; this gave a crop of 576 lb. potatoes, or at the rate of 11,520 lb. per acre, as compared with 413 lb . to the plot or 8,260 lb. to the acre in the unmanured area. The difference therefore in favour of the treated plot was at the rate of 3,260 lb. per acre, which at Rs. 1.6 per 100 lb. gave a profit of Rs. 44, or nearly 59*s*. This, against the cost of 80 lb. nitrolim, say Rs. 18, shows a net gain of about Rs. 26 per acre by using this fertilizer.—Tropical Life.

PLANT AND SEED SUPPLIES.

Members of the C.A.S. are informed that **Grafted Plants and Vegetable Seeds** for North East Monsoon Planting are ready for distribution. Those who have booked orders are requested to communicate with the Foreman, Government Stock Garden, Colombo.

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VARIETIES OF LUCERNE.

Experiments with lucerne seed from various sources were carried out from 1900-12 at the Danish Experiment Station at Tystofte, Lyngby, and Askov. The origin of the seed and the relative yields in terms of the yield from Hungarian seed were as follows:—

Origin	First year crop.	Second year crop.	Third year crop.
Hungarian	100	100	100
German	102	92	89
French	102	96	97
Italian	104	96	90
Russian	94	83	69
American	45	49	67

Hungarian seed showed great permanence, and was found to be the best for Danish conditions. The first cutting of every year yielded a good crop, but the aftergrowth was not as good. It will be noticed that the first year's yield from some of the other varieties was greater than from Hungarian seed.

At Lyngby in 1910-11 the effect of cutting the lucerne in the year of seeding was tested. It was found that the first year's crop, together with the yield in the year of seeding, were not equal to the first year's crop where the lucerne had been left untouched in the year of seeding.—BOARD OF AGRICULTURE JOURNAL.

COFFEE AT PERADENIYA.

All the varieties of coffee have been systematically sprayed with a mixture of fish-oil soap and kerosene oil, under the direction of MR. RUTHERFORD and the green scale (*Coccus viridis*) is gradually being killed out; but owing to the downward hanging and curled habit of the leaf, spraying has to be very carefully done in order that every leaf inside shall get some of the mixture and all young be destroyed. MR. RUTHERFORD tried painting some twigs and leaves with "Vermisapon" of extra strong quality but it had no effect whatever on the scale.

The hybrid coffee trees planted round the show beds form a striking example of the disease-resisting abilities of products if well cultivated and manured. These bushes nearest the bungalow, though attacked by the scale, have been able to resist it and are in heavy bearing, having been well manured with cattle manure last year, whereas several of those on the other side, having had no manure, have quickly died out once the pest obtained a good hold. These are, however, sending up strong suckers from the stool, after having been cut down.

A bush of robusta coffee that was badly affected by scale was selected, and leaves from a neighbouring bush that had had all the scale destroyed by the fungus (*Cephalosporium lecanii*), were taken and fixed on to the back of scale-infected leaves, to see if the fungus would do the work of spraying. This was done four weeks ago and already the fungus has spread so rapidly as to kill out quite half the scale, and it will be interesting to see if the scale will be completely eradicated without further attention in adding fresh fungus leaves. Without a doubt the Robusta resists the effects of the scale very well.

D. S. CORLETT,
Manager, Experiment Station, Peradeniya.

LAC CULTURE IN CEYLON.

The following note on "Lac Culture in Ceylon" was read by MR. DRIEBERG at the August Meeting of the Society :—

In 1910 PROF. DUNSTAN suggested to the Secretary the introduction of the Indian lac insect into Ceylon. The matter was referred to MR. E. E. GREEN, the Government Entomologist, who favoured the proposal, as his own efforts in this direction had proved unsuccessful. Accordingly the Secretary placed himself in communication with the Imperial Government Entomologist, and it was ultimately decided to send MR. N. WICKREMARATNE, one of the Society's Instructors, to the Research Institute, Pusa, for a short course of training in lac culture. Since MR. WICKREMARATNE'S return, a series of experiments were conducted under his supervision ; the first trials were begun in October, 1912, with imported brood lac on masan ("Zizyphus jujuba") The insects made good growth but were attacked by ants and other predaceous insects. The resulting lac was pronounced satisfactory when sent to Pusa but no brood-lac was procurable for further inoculation. The second trials began in February last with imported brood-lac on kon ("Schlichea tijuga") as well as masan. The most satisfactory results were those made on Maligatenne Estate, Kandy, with the co-operation of MR. K. BANDARA BEDDEWELA, to whom the thanks of the Society are due for the interest he took in the experiments. A sample of the lac (both stick lac and seed lac) are shown to-day and it will be seen that it is of excellent quality. The next trials will be on the rain-tree ("Pithecolobium saman") for which brood lac is expected almost immediately.

FORESTRY EXPERIMENT IN QUEBEC.

It is reported that work undertaken by the Quebec Government of reclaiming an extensive tract of country in this province, and planting it with timber, is now producing excellent results. The land, once devoted to the growing of barley, had deteriorated into a desert of fine dust, large drifts from which were threatening the surrounding country. Millions of seedlings in the Government Nursery at Berthier are available for planting purposes,

and this year, with twelve students working at the rate of some 8,000 seedlings a day, about thirty acres have been planted. The present arrangement between farmers and the Government is that the latter buys the land at $1 an acre, plants it with trees, undertakes to return it to the former owner, if he cares to buy, at the end of eight or ten years, for the cost of production. This return purchase price is in no case to exceed $10 an acre.—United Empire.

MADAGASCAR CLOVES.

The quantity of Madagascar cloves exported in 1912 was 207 tons, valued at £15,778, as compared with 128 tons, valued at 10,281 in 1911. The clove plantations in Madagascar comprise 400,000 trees, of which 230,000 are on the island of Sainte Marie. The average local price of cloves during 1912 was from 6½d. to 7½d. per lb., of the exports the United Kingdom received 60 tons.—Chemist and Druggist.

IRRIGATION IN AUSTRIA.

The area to be irrigated was [at the Royal Imperial College of Agriculture] a 10 acre field of lucerne, which at the beginning of the operations, was in its fourth year. As levelling was impossible, and the nature of the ground precluded the use of irrigation channels, the field had to be flooded. The experiments were made in 1908, 1909 and 1910. The five years' precipitation observations made at the experimental farm showed a normal deficit in the rainfall accentuated by unfavourable distribution of the rains. Underground water only could be employed for irrigation, as surface-streams were lacking. The water was raised by means of centrifugal pumps driven by benzine-motors. Of the 10 acres, an area of 1 hectare (2·47 acres) was selected for experiment. This was divided into 10 plots of a quarter of an acre each. One plot remained unirrigated and acted as control. The other plots were so irrigated that three received about 148,000 cu. ft. of water during the vegetative period, three received 258,000 cu. ft., while the other three were only irrigated in the autumn. All the lots were manured alike.

The following results were obtained :—

On the unirrigated plot, there was a close relation between the temperature and the time of harvest and also between the rainfall and the amount of the crop. This plot yielded three crops with 28 cwt. of dry substance per acre. Only the first crop was satisfactory, the others being poor and unreliable.

Four crops, however, were obtained from the irrigated plots, average results being as follows :—

1. Plots irrigated during the vegetative period with 148,000 cu. ft. of water produced 4 tons of dry matter per acre.

2. Plots irrigated during the vegetative period with 258,000 cu. ft. of water yielded 3 tons of dry matter per acre.

3. Plots which were only irrigated in the autumn yielded 3½ tons of dry matter per acre.

Thus an excess of moisture caused a decrease in the crop. The technical preliminary investigations were carried out by the Professor of Agriculture at the College, Dr. R. Fischer.—Monthly Bulletin.

A NEW OIL-SEED FROM GERMAN NEW GUINEA.

DR. KRAUSE, of the Hydrotherapeutic Institute of Berlin University describes in the March number of DER TROPENPFLANZER the fat obtained from the fruits of *Canarium polyphyllum*, a tree indigenous to and widely distributed in New Guinea. The fruit is about the size of a Bassia fruit, and, like the latter, consists of a fleshy pericarp, a hard brown shell, and a kernel. The nuts—that is, the fruits freed from pericarps—weigh about 9 grams each and the kernels about 2 grams each. The kernels contain 68·23 per cent. of fat having the following constants : solidifying-point 19°-20° C., melting-point 30° C., refractive index 1·4750 at 21° C., saponification-value 226, iodine number 59·74, and Reichert-Meissl value 4·41. The fat is considered suitable for edible purposes and is of yellowish-white colour. It is suggested that the material is promising enough to warrant investigation with a view to ascertaining whether the kernels can be collected at a low enough price to warrant their export to Europe. *C. commune (Colophania Mauritiana)* also yields kernels rich in fat, as much as 68·6 per cent. having been recorded from this source. This species is said to be common in Malaysia and in Mauritius, and it also yields a kind of elemi.—THE CHEMIST & DRUGGIST.

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CACAO AT PERADENIYA EXPERIMENT STATION.

July and August, 1913.

One round yielding a very small picking has been done. The cacao seems to be setting very well, especially the trees from the G. Badulla Pod 1 (Keenakella tree) some of the trees bearing about 130 pods at ten years old.

Dadap cuttings have been planted in the young 10 acre cacao plot to take the place of those to be cut down next year.

It is very noticeable that a large majority of the young pods in this plot have been attacked by Helopeltis, probably owing to the removal of the shade. The diseased pods have been removed.

D. S. CORLETT

Ceylon Agricultural Society

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(*See Advertisements on Page vi.*)

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ALOES, Socotrine cwt.	Fair to fine	45/6 a 55/
Zanzibar & Hepatic ,,	Common to good	40/ a 65/
ARROWROOT (Natal) lb.	Fair to fine	7d a 7½ d
BEES' WAX cwt:		
Zanzibar Yellow ,,	Slightly drossy to fair	£7 7/6 a £7 10/
East Indian, bleached ,,	Fair to good	£8 10/a £8 12/6
,, unbleached ,,	Dark to good genuine	£6 5/ a £6 15/
Madagascar ,,	Dark to good palish	£7 10/ a £7 15/
CAMPHOR, Japan lb.	Refined	1/ 4½ a 1/6
China cwt.	Fair average quality	155/
CARDAMOMS, Tuticorin	Good to fine bold	5/ a 5/6
per lb	Middling lean	4 11 a 4/9
Malabar, Tellicherry ,,	Good to fine bold	4/ II a 5/
Calicut ,,	Brownish	4/1 a 4/6
Mangalore ,,	Med Brown to good bold	4/10 a 6/4
Ceylon, Mysore ,,	Small fair to fine plump	4/ a 5/9
Malabar ,,	Fair to good	3/4 a 3/6
Seeds, E. I. & Ceylon ,,	Fair to good	4/2 a 4/4
Ceylon "Long Wild" ,,	Shelly to good	1/2 a 3/2
CASTOR OIL, Calcutta ,,	Good 2nds	3⅞ d
CHILLIES, Zanzibar cwt.	Dull to fine bright	37/6 a 45/
Japan ,,	Fair bright small	28/ a 32/6
CINCHONA BARK.—lb.	Crown, Renewed	3⅜ d a 7 d
Ceylon	Org. Stem	2d a 6d
	Red Org. Stem	1¾ d a 4¼d
	Renewed	3d a 5½d
	Root	1⅞d a 4d
CINNAMON, Ceylon 1sts.	Good to fine quill	1/3 a 1/7
per lb. 2nds.	,, ,,	1/2 a 1/6
3rds.	,, ,,	1/1 a 1/5
4ths.	,, ,,	1/ a 1/3
Chips, &c.,	Fair to fine bold	2d a 4d
CLOVES, Penang lb.	Dull to fine bright pkd.	11d a 1/1
Amboyna ...	Dull to fine	10d a 10½d
Zanzibar ...	Fair and fine bright	7½d a 8¼d
Madagascar ...	Fair	8¾d
Stems ...	Fair	3d
COFFEE		
Ceylon Plantation cwt.	Medium to bold	Nominal
Native	Good ordinary	Nominal
Liberian ,,	Fair to bold	74/a 82/
COCOA, Ceylon Plant. ,,	Special Marks	86/ a 92/6
	Red to good	81/ a 85/
Native Estate ,,	Ordinary to red	42/ a 78/6
Java and Celebes ,,	Small to good red	30s a 93s
COLOMBO ROOT ,,	Middling to good	14/ a 21/
CROTON SEEDS, sifted,,	Dull to fair	45/ a 50/
CUBEBS ,, ,,	Ord. stalky to good	140/ a 170
GINGER, Bengal, rough ,,	Fair	30/ nom.
Calicut, Cut A ,,	Medium to fine bold	60/ a 75/5
B & C ,,	Small and medium	36/ a 60/
Cochin, Rough ,,	Common to fine bold	27/ a 30/
	Small and D's	27/6
Japan ,,	Unsplit	21/
GUM AMMONIACUM ,,	Ord. Blocky to fair clean	40s a 72s 6d
ANIMI, Zanzibar	Pale and amber, ster. srts	£12 10/ a £1 45/1
,,	,, ,, little red	£11 a £12
,,	Bean and Pea size ditto	70/ a £9
,,	Fair to good red sorts	£7 a £10
,,	Med. and bold glassy sorts	£5 a £7 10/
Madagascar ,,	Fair to good palish	£4 a £8
	,, ,, red	£4 a £7
ARABIC E. I. & Aden ,,	Ordinary to good pale	28/ a 32/ nom
Turkey sorts ,,		32/6 a 55/
Ghatti ,,	Sorts to fine pale	18/6 a 32/6 nom
Kurrachee ,,	Reddish to good pale	25 a 30s nom
Madras ,,	Dark to fine pale	22/6 a 29/6 nom
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	£7 a £8
	com. stony to good block	40s a £5 1 2/6
KINO lb.	Fair to fine bright	6d a 1/5
MYRRH, Aden sorts cwt.	Middling to good	50/ a 62/6
Somali ,,	,, ,,	42s 6d a 45s
OLIBANUM, drop ,,	Good to fine white	45s a 50s
,,	Middling to fair	35s a 40s
pickings ,,	Low to good pale	15/ a 27/6
siftings ,,	Slightly foul to fine	20s a 22s 6d
INDIA RUBBER lb.	Fine Para bis. & sheets	2/9
	,, Ceara ,, ,,	2/5½
Ceylon, Straits, Malay Straits, etc.	Crepe ordinary to fine	2/6½ a 2/7
	Fine Block	2/6
	Scrap fair to fine	1/7 a 1/9
Assam	Plantation	2/
	Fair 11 to ord. red No. 1.	1/3 a 1/7
Rangoon	,, ,, ,,	1/3 a 1/6

	QUALITY.	QUOTATIONS.
INDIARUBBER lb.		
Borneo ,,	Common to good	9d a 1/2
Java ,,	Good to fine red	1/4 a 1/5
Penang ,,	Low white to prime red	9 d a 1/3
Mozambique ,,	Fair to fine red ball	1/10 a 2/2
,,	Sausage, fair to good	1/9 a 2/1
Nyassaland ,,	Fair to fine ball	1/9 a 2/1
Madagascar ,,	Fr. to fine pinky & white	1/6 a 1/9
,,	Majunga & blk coated	1/ a 1/3
,,	Niggers, low to good	6d a 1/6
New Guinea ,,	Ordinary to fine ball	1/6 a 1/8
INDIGO, E.I. Bengal ,,	Shipping mid to gd. violet	3s a 3s 6d
,,	Consuming mid. to gd.	2s 3d a 2s 10d
,,	Ordinary to middling	2s a 2s 2d
,,	Mid. to good Kurpah	1s 10d a 2s 5d
,,	Low to ordinary	1s 6d a 1s 9d
,,	Mid. to fine Madras	None here
MACE, Bombay & Penang	Pale reddish to fine	2/6 a 2/8
per lb.	Ordinary to fair	2/2 a 2/4
Java	,, ,, good pale	2/4 a 2/8
Bombay	Wild	10d a 1/
NUTMEGS,— lb.		
Singapore & Penang ,,	64's 57 s	9½d a 10½d
	80's	7d
	110's	6½d
	160's to 115's	6d
NUTS, ARECA cwt.	Ordinary to fair fresh	17/6 a 20/
NUX VOMICA, Cochin	Ordinary to good	9/6 a 12/
per cwt. Bengal	,, ,,	8/9
Madras	,, ,,	8/6 a 9/6
OIL OF ANISEED lb.	Fair merchantable	6/11
CASSIA ,,	According to analysis	3/ a 3/5
LEMONGRASS oz.	Good flavour & colour	3d
NUTMEG ,,	Dingy to white	1½d a 1⅜d
CINNAMON ,,	Ordinary to fair sweet	3½d a 1s 5d
CITRONELLA lb.	Bright & good flavour	1/9½
ORCHELLA WEED—cwt		
Ceylon ,,	Fair	10/ Nom.
Madagascar ,,	Fair	10/ ,,
Zanzibar ,,	Fair	10/ ,,
PEPPER—(Black) lb.		
Alleppy & Tellicherry	Fair	5⅛d a 5½d
Ceylon ,, ,,	Fair to fine bold heavy	5½d a 5¾d
Singapore ...	Fair	5⅜d
Acheen & W. C. Penang	Dull to fine	5d a 5½d
(White) Singapore ,,	Fair to fine	8¾d a 9d
Siam ,,	Fair	8½d
Penang ,,	Fair	8d
Muntok ,,	Fair	9¼d
RHUBARB, Shenzi lb.	Ordinary to good	3/6 a 4/6
Canton ,,	Ordinary to good	3/ a 4/
High Dried,,	Fair to fine flat	1/ a 1/2
	Dark to fair round	10d a 1
SAGO, PEARL, large--cwt	Fair to fine	18/
medium ...	,, ,,	17/
small ...	,, ,,	13/ a 15/
Flour ...	Good pinky to white	11/ a 12/
SEEDLAC cwt.	Ordinary to gd. soluble	65/ a 85/
SENNA, Tinnevelly lb.	Good to fine bold green	4½d a 8½d
	Fair greenish	3 d a 4d
	Common specky & small	1¼d a 2¾d
SHELLS, M. o' PEARL—		
Egyptian cwt.	Small to bold	82/6 a £ 9 10/
Bombay ,,	,, ,,	70/ a £9 2/6
Mergui ,,	Chicken to bold	10 17/6 a 14 2/6
Manilla ,,	Fair to good	£9 5/ a £14 10/
Banda ,,	Sorts	70/ a 90/
Green Snail ,,	Small to large	55/ a 92/6
Japan Ear ,,	Trimmed selected small to bold	72/6 a £9
TAMARINDS, Calcutta...	Mid to fine bl'k not stony	12/ a 13
per cwt. Madras	Inferior to good	6/ a 10/
TORTOISESHELL—		
Zanzibar, & Bombay lb.	Small to bold	13/ a 34/
	Pickings	13/ a 21/
TURMERIC, Bengal cwt.	Fair	15/ nom
Madras ,,	Finger fair to fine bold	16/ a 17/6
Do. ,,	Bulbs ,, ,, [bright	13/ a 14/6
Cochin ,,	Finger fair	14/ a 15/
	Bulbs ,,	13/ a 14/
VANILLOES— lb.		
Mauritius ... } 1sts.	Gd. crystallized 3½a 8½a in.	11/6 a 16/
Madagascar ... } 2nds.	Foxy & reddish 3½a ,,	11/ a 12/6
Seychelles ... } 3rds.	Lean and inferior	11/ a 11/6
VERMILLION ...	Fine, pure, bright	2/9
WAX, Japan, squares	Good white hard	44/9

DISEASED PLANTAINS. (BANANA) SUCKERS.

(*See Page 427*)